DECISION SUPPORT SYSTEM DEVELOPMENTS

MAJOR EUROPEAN MARKETS

INPUT

INPUT provides planning information, analysis, and recommendations to managers and executives in the information processing industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions. Continuing services are provided to users and vendors of computers, communications, and office products and services.

The company carries out continuous and in-depth research. Working closely with clients on important issues, INPUT's staff members analyze and interpret the research data, then develop recommendations and innovative ideas to meet clients' needs.

Clients receive reports, presentations, access to data on which analyses are based, and continuous consulting.

Many of INPUT's professional staff members have nearly 20 years' experience in their areas of specialization. Most have held senior management positions in operations, marketing, or planning. This expertise enables INPUT to supply practical solutions to complex business problems.

Formed in 1974, INPUT has become a leading international planning services firm. Clients include over 100 of the world's largest and most technically advanced companies.

Offices

NORTH AMERICA

Headquarters
1943 Landings Drive
Mountain View, CA 94043
(415) 960-3990
Telex 171407

New York
Parsippany Place Corp. Center
Suite 201
959 Route 46 East
Parsippany, NJ 07054
(201) 299-6999
Telex 134630

Washington, D.C.
8298 C, Old Courthouse Rd.
Vienna, VA 22180
(703) 847-6870

EUROPE

United Kingdom
INPUT
41 Dover Street
London W1X 3RB
England
01-493-9335
Telex 27113

Italy
Nomos Sistema SRL
20124 Milano
Viale Vittorio Veneto 6
Italy
228140 and 225151
Telex 321137

Sweden
Athena Konsult AB
Box 22232
S-104 22 Stockholm
Sweden
08-542025
Telex 17041

ASIA

Japan
ODS Corporation
Dai-ni Kuyo Bldg.
5-10-2, Minami-Aoyama
Minato-ku,
Tokyo 107
Japan
(03) 400-7090
Telex 26487

INPUT®
Planning Services For Management

DECISION SUPPORT SYSTEM DEVELOPMENTS
MAJOR EUROPEAN MARKETS

NOVEMBER 1986

Research produced by
INPUT
41 Dover Street
London W1X 3RB
England
01-493-9335

Software and Services Planning Service - Western Europe (SSPS)

Decision Support System Developments - Major European Markets

DECISION SUPPORT SYSTEM DEVELOPMENTS
MAJOR EUROPEAN MARKETS

ABSTRACT

Decision Support Systems (DSS) have evolved over the last 25 years to become powerful software applications that provide finanical modelling capability, DBMS handling, and enquiry system features. This INPUT study focuses on the market for this type of product in the four major European country markets of France, Italy, the United Kingdom, and West Germany.

This report provides software vendors with an analysis and forecast of these markets up to 1991. It examines user needs, including background material on the evolution of DSS systems and the decision-making environment within organisations.

The major DSS marketing challenges for vendors, the driving and inhibitory forces on the market, and potential future developments are discussed.

This report contains 130 pages, including 38 exhibits.

S-DSE-519

INPUT

DECISION SUPPORT SYSTEM DEVELOPMENTS
MAJOR EUROPEAN MARKETS

CONTENTS

INPUT
S-DSE-519

INPUT

DECISION SUPPORT SYSTEM DEVELOPMENTS
MAJOR EUROPEAN MARKETS

EXHIBITS

INPUT

INPUT

I INTRODUCTION

I INTRODUCTION

A. OBJECTIVES AND SCOPE

- Decision Support Systems (hereafter referred to as DSS) have become an established part of the software scene over the last few years despite the fact that there exists considerable confusion as to what a DSS is.

- In this report, INPUT has set out to determine the market for packaged software that provides a modelling capability as a central facility. As a result, pure spreadsheet packages for personal computers are excluded from INPUT's definition of the DSS market.

- As software products have been introduced into the marketplace, there has been a tendency for the term DSS to be widely used in many different ways, particularly by vendors anxious to position their products to maximum advantage.

- In particular, some new developments in artificial intelligence are being presented as DSS. INPUT has not included these in its market analysis.

- A separate report, Artificial Intelligence - European Market Opportunities, INPUT 1986, examines opportunities in the development of artificial intelligence software.

INPUT

- INPUT has analysed the market for DSS in the four major Western European markets of France, Italy, the United Kingdom, and West Germany. The term 'Western Europe' is used to imply these four country markets as a group in this report.

- Enquiries and comments regarding this report and any related topics of interest are welcomed by INPUT.

- INPUT would like to express its thanks to all those companies and individuals who participated in the research undertaken for this report.

B.   METHODOLOGY

- Field research for this study was conducted during 1986 both with vendors of DSS and amongst the user community.

- User research was carried out through the medium of a mailed self-completion questionnaire in the United Kingdom and by means of a telephone survey in France, Italy, and West Germany. The questionnaire used is included as Appendix C.

- Altogether some 45 self-completion quesionnaires were returned out of a total mailing of 720, representing a return rate of 6%. Forty-nine telephone interviews were conducted with users in France, Italy, and West Germany.

- Vendor research was conducted by means of both personal face-to-face interviews and telephone interviews. In total some 36 vendors of DSS were contacted in the four major European country markets.

- The questionnaire used for the vendor research programme is included as Appendix D.

- 2 -

INPUT

- An analysis of both the vendor and user sample is included as Appendix A.

C. REPORT STRUCTURE

- The remaining chapters of this report are structured as follows:

    - Chapter II is an Executive Overview.

    - Chapter III provides a background perspective on the evolution of the DSS market and examines use patterns for types of decision support.

    - Chapter IV describes observed vendor activity in the DSS market, user approaches, and product use.

    - Chapter V provides further background on the DSS market environment through an analysis of the user sample and the sources of information used by DSS users.

    - Chapter VI discusses INPUT's market analysis and forecast.

    - Chapter VII addresses DSS vendor marketing challenges and market driver and inhibitor analysis looked at from both a user and vendor standpoint.

    - Chapter VIII describes INPUT's view of future development of the DSS markets in Western Europe.

    - The appendices include an analysis of the user and vendor sample, assumed currency exchange rates, the user and vendor questionnaires, and a list of related INPUT reports.

INPUT

II EXECUTIVE OVERVIEW

II EXECUTIVE OVERVIEW

- This Executive Overview is designed in a presentation format in order to:

    - Help the busy reader quickly review key research findings.

    - Provide a ready-to-go executive presentation, complete with script, to facilitate group communication.

- The key points of the entire report are summarised in Exhibits II-I through II-7. On the left-hand page facing each exhibit is a script explaining its contents.

- 5 -

INPUT

A.   DSS MARKET EVOLUTION

- Over the last 25 years, DSS software has evolved from its early roots in operational research systems and transaction processing systems. DSS is now viewed as a powerful software application that provides financial modelling capability, DBMS handling, and inquiry system features.

- This definition has been clouded as fourth generation languages, integrated spreadsheets, and traditional DBMS have been partly positioned in the market as decision support systems.

- This product positioning has occurred as a direct result of the increasing focus on data acquisition and integration issues for DSS users and the obvious need to maximise sales revenues.

- INPUT's market definition focuses on DSS systems with strong capability in financial modelling whether provided for mainframes, minis, or personal computers. It excludes those packages which are primarily spreadsheets.

INPUT

EXHIBIT II-1

INPUT®

DSS MARKET EVOLUTION

- **Operational Research/Transaction Processing**

- **DSS Positioning:**

    - **Fourth Generation Languages**

    - **DBMS**

- **DSS Definition - Financial Modelling**

SDSE J

INPUT

B.   DSS MARKET GROWTH

- The DSS market is expected to grow at around 18% per annum from about $140 million in 1986 to reach over $300 million by 1991.

- The traditional DSS software market is maturing in the United Kingdom where overall growth is expected to be lower than average.

- Growth opportunities still exist in the less mature markets of France, West Germany, and Italy. The largest growth opportunity will emerge in the West German market.

- The most mature, and consequently the slowest growing sector of the DSS market, is that for mainframe-based products. Overall growth of 10% per annum is forecast for this sector over the five-year period.

- In contrast, relatively high growth (27%) is anticipated in the personal computer sector as the rapidly increasing base and power of personal computers continues to develop.

- Professional services related to DSS, primarily consulting and training, will continue to be in high demand, and overall growth of 19% per annum is forecast. The widening population of DSS users will drive the demand for these services.

- 8 -

EXHIBIT II-2

INPUT®

DSS MARKET GROWTH
(Four Major European Country Markets)

INPUT
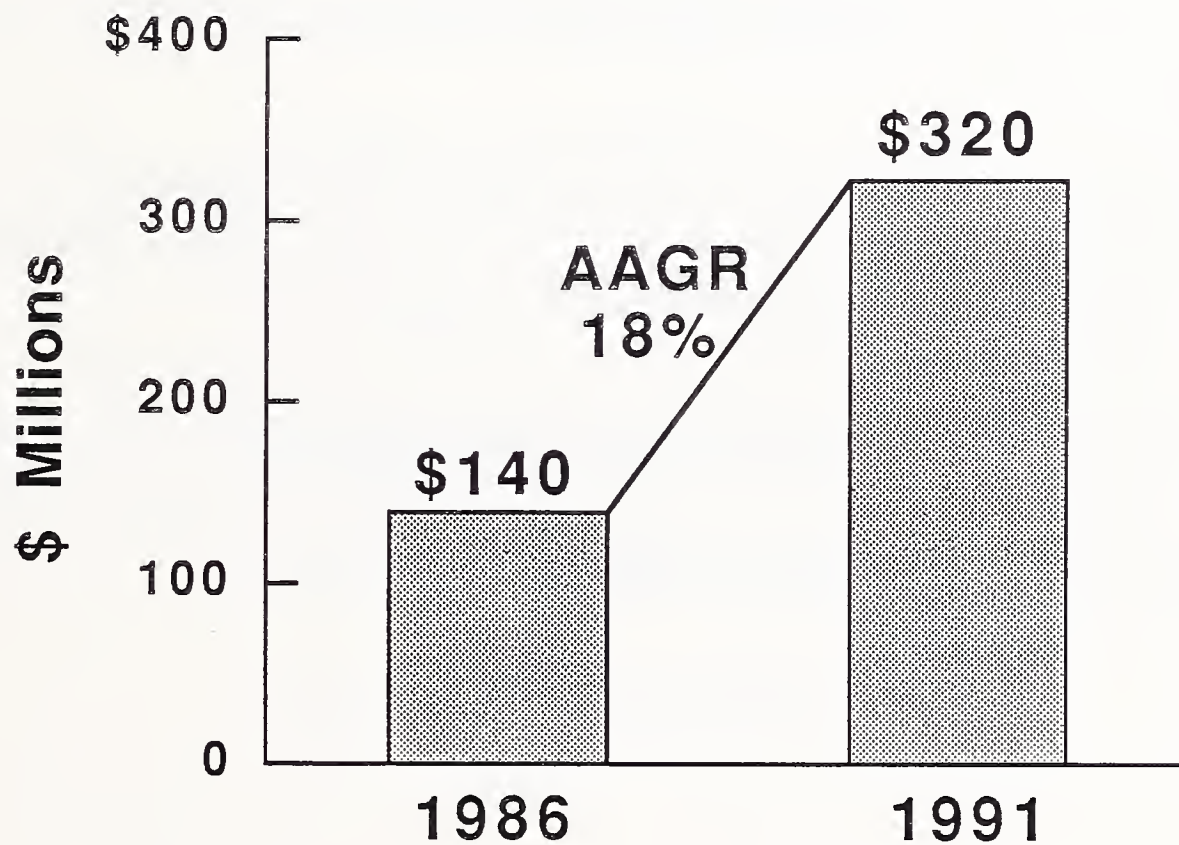
C.   MOST IMPORTANT USER NEEDS

- Data management was clearly rated as the most important feature of a DSS package by users. It was not, however, so highly rated by the vendors who as a group favoured modelling language and report generators as the most significant features.

- Users rated these latter as important, but less important than ease of use and ease of learning.

- Users and vendors have been heavily influenced by personal computer spreadsheets and the ease of use features most commonly associated with this level of computer application.

- Vendor support is still considered an important service by users, underlining the inherent complexity in much decision support software despite any improvements in the 'ease of use' category.

INPUT

EXHIBIT II-3

INPUT®

MOST IMPORTANT USER NEEDS

- Data Management

- Ease of Use

- Ease of Learning

- Modelling Language

- Report Generator

- Vendor Support

- II -

INPUT

D.   MAJOR MARKETING CHALLENGES

- DSS vendors were concerned that user education was able to convey the real features and benefits of their product and that they could maximise the revenues obtained from this area.

- Vendors were clearly becoming increasingly aware of the need to obtain correct positioning of their product in the market. Important considerations were the lack of DSS knowledge by end users and the consequent difficulty in distinguishing differences between a full function DSS tool and a simple spreadsheet product.

- The relative maturity of the DSS market is a concern for a number of vendors. This implies the need for market segmentation and the development of specialised products.

- Specialised product development is evidenced by PC-based products and products aimed at specialised areas of decision making; for example, marketing or merchandising.

- Price is most clearly a key marketing concern in relation to personal computer-based products where a problem of positioning against basic spread-sheet packages exists. More significantly, the cost of pre-sales consultancy represents a challenge to vendors.

- 12 -

INPUT

EXHIBIT II-4

INPUT®

MAJOR MARKETING CHALLENGES

- **User Education**

- **Marketing to the User**

- **Market Maturity**

- **Product Development**

- **Price**

SDSE J

INPUT

E.   THE MARKET DYNAMICS

- Market driving forces can be classified into two broad areas: business and management factors and technical factors.

- Business and management factors include the perceived need for managers to cope with more data and the need for better quality information. These result from a trend toward smaller, more centralised marketing groups and the need to be more responsive to changing market conditions.

- Technical factors included 'end-user' system development capability, improved computer interfaces, and, most importantly, and perhaps paradoxically in view of vendors' concerns about user education, the wide awareness of spreadsheet products.

- Inhibiting factors on market growth centered around management inertia and DSS product complexity.

- Vendors cited the general tendency to react against new ideas and the divergence between typical corporate culture and DSS methods as examples of the former.

- The complex nature of DSS products implies long sales cycles and potential confusion amongst purchasers. The generic nature of most DSS products makes it difficult initially to relate them to specific application needs.

- | 4 -

INPUT

EXHIBIT II-5

THE MARKET DYNAMICS

- ● **Drivers**

  - **Business/Management**

  - **Technical**

- ● **Inhibitors**

  - **Inertia**

  - **Product Complexity**

SDSE J

INPUT

F.   FUTURE DEVELOPMENT

- INPUT expects that vendors will increasingly integrate DSS software with other applications; for example, in areas such as financial accounting packages, manufacturing systems, marketing systems, electronic data interchange (EDI), and electronic mail.

- Increasing emphasis will be placed on data acquisition, data management, and such developments as micro-mainframe links.

- These trends are a response to the need to widen the scope for DSS, focusing more on user needs and extending the market toward the executive decison maker. User investment in existing applications is also an important factor.

- INPUT expects artificial intelligence (AI) technology to become increasingly integrated into DSS products. Initially, this is expected to be much more prolific at the PC rather than the mainframe end of the market.

- 16 -

INPUT

EXHIBIT II-6

INPUT®

FUTURE DEVELOPMENT

- **Applications Integration**

  - **Financial**

  - **Manufacturing**

  - **Marketing**

- **Systems Software Integration**

  - **Micro-Mainframe Links**

  - **DBMS**

- **Artificial Intelligence**

SDSE J

INPUT

G.   RECOMMENDATIONS

- DSS software vendors will need to place increasing emphasis on product integration in the future. DSS products increasingly will need to interface to or include specific applications (e.g., in finance and manufacturing), system software such as DBMS and new developments in artificial intelligence (e.g., expert systems and natural language interfaces).

- Consequently, vendors must develop their marketing activity to focus sales effort on more specialised market segments.

- Successful DSS vendors will study user needs carefully to be able to respond to those requirements with their products. They will place considerable importance on training and education requirements to fully exploit inherent product benefits.

- 18 -

INPUT

EXHIBIT II-7

INPUT®

RECOMMENDATIONS

- **Product Integration:**

  - **Applications**

  - **System Software**

  - **AI**

- **Focused Marketing**

- **Emphasize User Needs:**

  - **Training/Education**

INPUT

III DECISION SUPPORT SYSTEMS MARKET EVOLUTION

III   DECISION SUPPORT SYSTEMS MARKET EVOLUTION

A.   DSS BACKGROUND

- The term 'Decision Support System' (DSS) has been in widespread use in the data processing world since the mid 1970s.

- The possibility of wide interpretation of the term DSS has, however, led to attempts to label practically any information processing system a 'decison support system'.

- In recent years there have been significant advances in the development of DSS 'software' packages that can be used by users to develop specific DSS systems.

- Additionally, the rapid and widespread development of personal computer software has heralded in a whole raft of spreadsheet-type products that exist on the fringe of the DSS product sector.

- More recently, the emergence of software products from the developments taking place in artificial intelligence and expert systems further cloud the attempt at a precise product definition.

- Given the widespread acceptance, if not understanding, of the term DSS by users, it is not surprising that vendors will attempt to gain maximum marketing leverage out of the positioning of their products as DSS tools.

- 21 -

INPUT

- In attempting to arrive at a meaningful description of DSS, INPUT commenced from the starting position of defining DSS at its broadest level as:

  - 'An interactive system that provides the user with access to decision models and data in order to support both semi-structured and unstructured decision-making tasks'.

- It is then possible to identify some unique characteristics that do provide further insight into what constitutes a computer-based DSS.

- In addition to the overall capability (as included in the definition above) to support unstructured and semi-structured decision-making tasks, a DSS will have the following characteristics:

  - Orientation to the future based on historical trends or parameters.

  - Used on an ad hoc or unscheduled basis.

  - Unique by application and traditionally financial in nature.

  - Often controlled by the end user (decision maker).

  - Usually includes capabilities to support data gathering.

- Overall a computer-based decision support system can be considered to consist of three basic elements.

  - Data.

  - Decison models.

  - The software system.

- 22 -

- Consequently, proprietary decision support software systems can be comprised of three basic components.

    - Language facility or user command processor.

    - Relevant knowledge base or data base.

    - Problem processor which provides the solution support.

- DSS software products today address these three components. The nature and the capability of the products varying by the relative emphasis placed on each component. These three major components are shown diagramatically in Exhibit III-1.

- Thus, the range of available software products can be considered as:

    - Standalone spreadsheet tools.

    - Integrated spreadsheet graphics packages.

    - DSS tools (e.g., n-dimensional arrays).

    - Integrated DSS data analysis tools (including FGL).

    - Integrated DSS including operational research tools.

    - Expert systems.

- And all of these products can be then provided in a number of different forms, for example:

    - Standalone PC.

    - Network PC.

- 23 -

INPUT

EXHIBIT III-1

DSS MAJOR COMPONENTS AND FUNCTIONS

Knowledge Base

- DBMS
- Data Extraction
- Micro-Mainframe Links
- Consolidation Rules

Language Facility

Problem Processor

- Logic/Math Processing
- Model Spreadsheet Execution
- Report Output
- Graphics

- User Interfaces
- Command Processors
- Model Building
- Report Writers
- Inquiry Languages

USER

- 24 -

INPUT
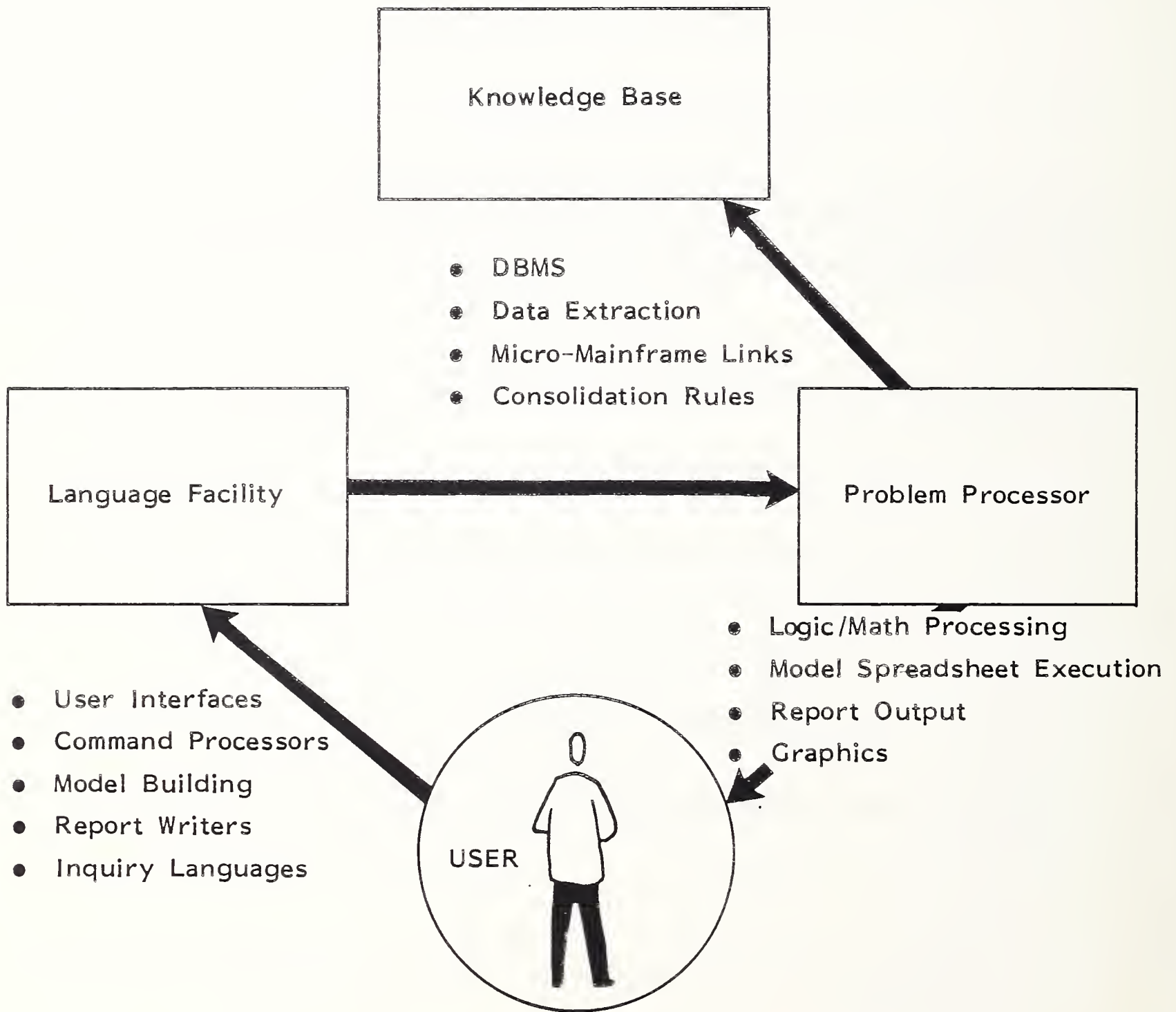
-       Mainframe.

-       Mini.

-       Bureau.

-       Part of a professional service.

-       Integrated system (turnkey).

B.   EVOLUTION OF DSS SOFTWARE

- Decision support software evolved from a combination of existing data processing applications and unmet user needs for dealing with future business uncertainty. From its origins in operations research, DSS tended to be complex, mathematical, and developed/maintained by 'gurus'.

- DSS also has roots in extensions of traditional business operational and trans-action systems such as accounting and scheduling. A need developed for manipulating current and past financial experience into modelling future financial conditions. Exhibit III-2 depicts this evolution.

- Decision support tools and systems have, in large part, evolved directly out of user needs which have affected:

  -       The basic nature of the software.

  -       The method of its delivery to the user.

- This caused users to look elsewhere for solutions and led to an even wider gap between end users of DSS and DP departments. Some of this led to:

- 25 -

INPUT

EXHIBIT III-2

DSS SOFTWARE EVOLUTION

1961-1975

```
┌─────────────────────────┐
│      TRANSACTION        │
│   PROCESSING SYSTEMS    │
└─────────────────────────┘
```

- Operational Data
  Processing Systems

- Accounting,
  Scheduling, Etc.

1975-1990   1980-????

```
┌─────────────────────┐   ┌─────────────────────┐
│                     │   │     ARTIFICIAL      │
│     DSS SYSTEMS     │   │    INTELLIGENCE     │
└─────────────────────┘   └─────────────────────┘
```

```
┌─────────────────────────┐
│      OPERATIONS         │
│   RESEARCH SYSTEMS      │
└─────────────────────────┘
```

- Financial Modeling   - Expert Systems

- Spreadsheets   - Natural Language
                              Processors
- DBMS Tools
                            - Knowledge-Based
- Inquiry Systems   Systems

- Statistical Analysis

- Economic Data
  Bases and Modelling
  Systems

- 26 -

INPUT

- Users acquiring DSS through remote computing services (RCS) and external consulting.

- DSS software vendors selling directly to end users.

- Users acquiring PCs and spreadsheet packages on their own in great numbers.

- DSS software containing a high degree of built-in help facilities to offset a lack of internal data processing support.

- In the last few years, there has been pressure for DSS users and DP departments to work more closely together due to:

  - Rapidly changing hardware technology.

  - Increasing complexity and more DSS tools for users to choose from.

  - Sophistication of applications.

  - DSS' increasing appetite for corporate data.

- Typical software, both microcomputer and mainframe, contains functions and characteristics which reflect the assumption that many end users provide their own support. General characteristics of DSS software are:

  - Responsive, highly interactive.

  - Usually visual.

  - Contains a high degree of self help.

- 27 -

- Often includes relatively good error handling.

- Includes facilities for acquiring data easily.

● The history of the methods employed for delivery reflect the independence of the end user in acquiring decision support solutions. DSS has:

- Often been supplied by RCS vendors.

- Been acquired without the 'blessing' or control of the DP department.

- Probably driven more by the acquisition of PCs (through spreadsheets) than any other application.

C. THE DECISION-MAKING ENVIRONMENT

● In order to fully comprehend the market for DSS products, it is important to understand the nature of business decision making and its relation to the way an organisation works.

● Decision support systems do not currently provide solutions to all types of decisions nor do they provide solutions at all levels.

● Decisions made within companies can be viewed as falling into three basic categories:

- Operational decisions.

- Tactical decisions.

- Strategic decisions.

- 28 -

INPUT

- Operational decisions are usually focused on day-to-day management of an organisation's activities, usually at a relatively low, front-line management level. Timeframes are short and data obsolescence is rapid. Decisions and problems tend to be fixed or semi-structured in nature.

- Tactical decisions are usually concerned with longer timeframes and associated with reaching established corporate plans and objectives. These decisions tend to cross organisational lines and deal with a higher level of uncertainty than operational decision-making. Tactical decision support relies on less precise or detailed data, dealing instead in trends, percentages, and averages.

- Strategic decisions span long timeframes and deal with broad organisational issues and plotting of corporate direction. This is typically the realm of top management and usually involves issues and decisions that:

  - Are less quantifiable.

  - Are highly uncertain.

  - Rely on data from a wide variety of sources, often non-financial.

  - Often are most influenced by management experience, insight, and intuition.

  - Are highly unstructured.

- Strategic decision making offers the greatest potential for decision support systems and also the greatest challenges and risks for DSS product and service vendors. Factors listed above, plus historical executive reluctance to directly accept computers, will make the growth of DSS slow at the top levels. However, the potential productivity and organisational gains are large and should continue to encourage their eventual implementation and acceptance.

INPUT

- Typically these decisions will be made by different levels of management and have different requirements for data.

- Exhibit III-3 provides a tabulated comparison of these different decision types, their relationship to the organisation, and the typical timeframes to which they belong.

- In practice there will be a considerable overlap of function. Exhibit III-4 shows an analysis of the respondent profile for INPUT's user survey in respect of the types of decisions made by DSS users.

- The analysis shown in Exhibit III-4 can be compared with the analysis of the management level of DSS users discussed in Chapter V.

- Other INPUT surveys have shown a widespread use of decision support tools at all organisational levels. Since many managers make operational, tactical, and strategic decisions, a direct correlation between organisation level and type of decision cannot be completely justified.

- It can be stated, however, that the most widely accepted DSS use has occurred at the middle-management level in support of tactical decisions in quantitative and analytical applications.

- Although a high percentage of respondents to recent INPUT surveys have reported to be end users of decision support, there is evidence to suggest that a significant number of these may not be decison makers, but rather 'knowledge workers'.

- The true decision maker relies on this function (financial analyst or system expert) to provide technical or application expertise and to provide digested data for support of decision making.

INPU'

EXHIBIT III-3

NATURE OF BUSINESS DECISION MAKING

DECISION TYPES	TIMEFRAMES	ORGANIZATION LEVELS/ CHARACTERISTICS	DECISION SUPPORT APPLICATION AREAS
Operational	Day-to-Day	• First Line Management • Usually Confined to Organizational or Departmental Lines	• Logistics, Material Distribution, Vehicle Dispatching, Production Scheduling
Tactical	Short to Medium	• Middle Management • May Cross Organizational Lines	• Financial and Budgetary Management, Inventory Management, Asset Acquisition, Personnel Administration
Strategic	Medium to Long Range	• Top Management • Consistently Crosses all Organizational Lines	• New Market Entry, New Product Offerings, Corporate Reorganizations, Facility Relocation, Mergers, Acquisitions

USX2(85)

INPUT

EXHIBIT III-4

TYPES OF DECISIONS - USER ANALYSIS
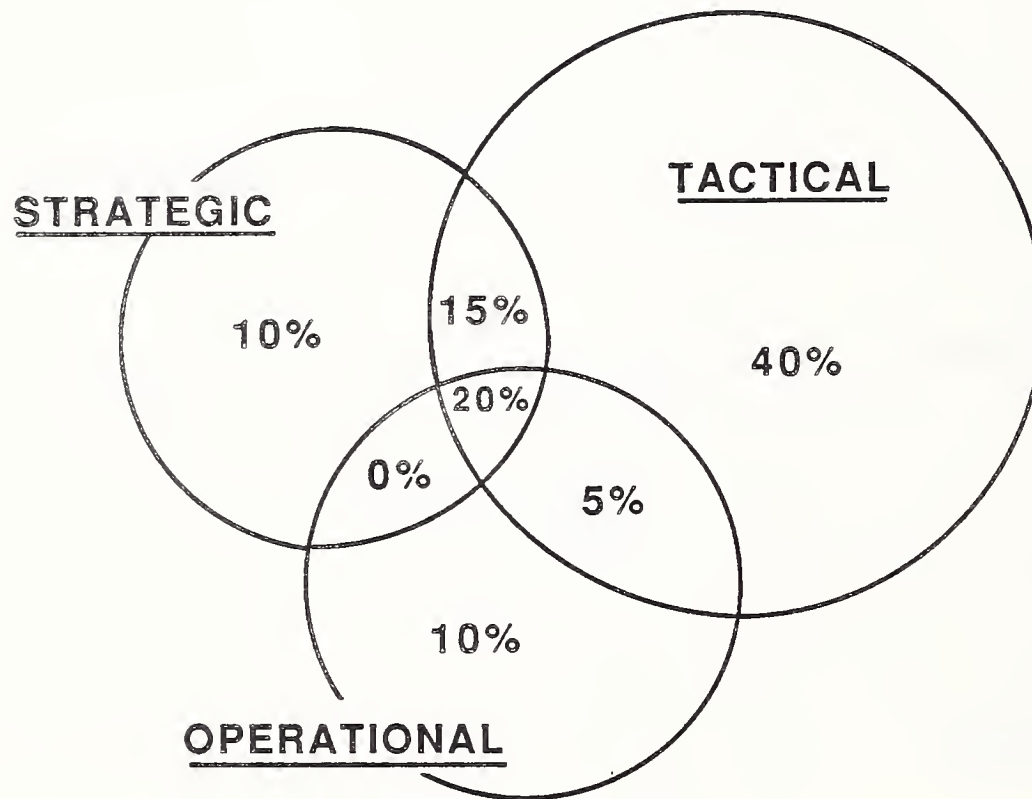
DECISION TYPE	NUMBER OF MENTIONS*	PERCENT
Strategic	28	26%
Tactical	54	50%
Operational	26	24%
* Multiple Answers	108	100%

INPUT

- Data acquisition and data base management are becoming key user needs. As larger numbers of users become more experienced with DSS and its complexities, issues such as data acquisition, corporate data bases, and timeliness of data take on added importance. Other DSS user needs in order of importance are:

  - Forecasting capability.

  - Modelling language.

  - Spreadsheets.

  - Report generation.

  - Graphics.

  - Financial functions.

  - Statistical functions.

  - Telecommunications.

- Growth of decision support systems within organisations can be categorised by stages of user and technical sophistication. These stages are:

  - Initial DSS user.

  - Maturing DSS user.

  - Advanced DSS user.

- Individuals and corporations exhibit patterns associated with a growing experience and sophistication. Exhibit III-5 details these traits in the following areas:

- 33 -

INPUT

EXHIBIT III-5

DSS USER GROWTH CHARACTERISTICS

	INITIAL DSS USER	MATURING DSS USER	ADVANCED DSS USER
Nature of Applications	Financially Oriented Applications, Single-Purpose Budgeting Analysis	Largely Financial, Wider Variety of Applications	Largely Financial, May Include Novel Applications or Artificial Intelligence
Support	End User Usually Technically Competent (Supports Self)	End Users Less Technically Competent	End User and Technical Support Divergence Well Established
Sources of Data	Standalone Systems, Data Manually Entered	Some Data Available from Other Sources	More Data Sharing, May include Micro-Mainframe Connections, Corporate Data Bases
Organizational Factor	Departmentally or Functionally Confined	Cross-Organization Applications Developing	Formal Cross-Organizational Applications
Personal Computer	Moderate Level of PC Spreadsheet Use	High Level of PC Applications	Large Numbers of PCs Throughout Organization
	Usually no Mainframe/Mini DSS Tools	May Have Mainframe/Mini Application Tools	Mainframe/Mini DSS Tools
Impact of Remote Computing Services	DSS May Be Delivered By Remote Computing Service	RCS Begining to Migrate In-House	Little RCS Used
Scope of DSS Tools	Limited Base of DSS Tools	Base of Tools Widens, May Include Mainframe DSS	Wide Variety of DSS Tools Available

INPUT

- Numbers and types of users.

- Level of applications sophistication.

- Delivery methods.

- Data acquisition methods.

- Number and sophistication level of DSS tools.

- Organisational factors.

● The evolution of the relationship between DSS and traditional data processing is worth examing. It provides a background for understanding the evolution of DSS software tools and services as well as the challenges ahead for fully exploiting 'organisation DSS'.

● Decision support systems grew out of user needs that traditional DP did not provide. These unfulfilled needs were based on quick response requirements and lack of access to information to guide the user through uncertainty.

● DP, it seems, was more concerned with efficiency, cost control, large structured long-term products, and centralised computer resource allocation.

- 35 -

INPUT

IV MARKET PERSPECTIVE

IV   MARKET PERSPECTIVE

A.   DELIVERY MODES

- Decision support systems can be provided through a number of different delivery modes. The profile of both vendor delivery and user experience represented by INPUT's field research for this study is shown in Exhibit IV-I.

- This profile demonstrates that DSS software packages represent the majority for both vendor delivery modes (86%) and end users (90%).

- The predominant modes of delivery for DSS software products are on mainframe computers and personal computers, as can be seen in Exhibit IV-I.

- This study is primarily concerned with software products that have their basis in financial modelling, and these systems were the type typically referred to by the user respondents as DSS.

- Proprietary DSS packages running on mainframe computers usually include the following characteristics:

  - A model building facility.

  - A data organisation capability.

INPUT

EXHIBIT IV-1

RANGE OF DELIVERY MODES FOR DSS

DELIVERY MODE	NUMBER OF MENTIONS*			
	VENDORS		USERS	
	NUMBER	PERCENT	NUMBER	PERCENT
Software Package				
- Mainframe	29	30%	49	36%
- Minicomputer	15	15%	13	10%
- Personal Computer	25	26%	41	30%
- Network PC	15	15%	19	14%
Bureau Service	6	6%	7	5%
Part of an Integrated System	6	6%	2	2%
Part of a Professional Service	2	2%	4	3%
Total	98	100%	135	100%

* Multiple Mentions Allowed

INPUT

- At least three-dimensional data capability.

- Financial and statistical functions.

- Graphics capability.

- A microcomputer version and/or link.

- Consolidation capability.

- Capability for multidimensional applications (like departmental budgeting, forecasting, and consolidations).

- In contrast the available personal computer-based packages offer such features as:

    - Simplicity and ease of use.

    - Single problem application orientation.

    - Highly visual user interface.

- The rapid growth and acceptance of personal computers allied to the use of products such as Lotus 1-2-3 has led to a significant percentage of users viewing spreadsheet-type functions as DSS.

- One user interviewed by INPUT, for example, said that mainframe-based tools had been abandoned in favour of Lotus 1-2-3, which they now found fully capable of meeting their decision support needs.

- About three-quarters of the users sampled reported the use of decision support systems on standalone personal computers.

- 39 -

INPUT

- In practice of course, personal computer-based spreadsheet products have a number of limitations. For example:

    - The basic orientation that forces all decision support functions into two-dimensional worksheets.

    - They are restricted to unstructured and relatively small amounts of data.

    - They have only limited consolidation or data manipulation capability.

- Contrasting characteristics of PC spreadsheets and mainframe-based DSS are shown in Exhibit IV-2.

- In fact, the use of packages for supporting decisions on personal computers can be broadly categorised into two groups:

    - Spreadsheets and integrated software.

    - Downsized versions of mainframe DSS products.

- Leading mainframe software vendors have, as a result of the pressures of the booming PC market, felt it necessary to introduce micro-based versions of their mainframe DSS products. Typical products in this category being micro FCS, Personal Wizard, and PC Empire.

- These products include similar functionality to their mainframe namesakes although they are typically restricted in either the data management area or in their speed of processing.

- The area of micro-mainframe links is important in this context. Three-quarters of all users interviewd stated that personal computers in their organisations were being linked to the mainframe facility.

INPUT

EXHIBIT IV-2

- 41 -

SPREADSHEETS VERSUS MAINFRAME DSS

PC SPREADSHEETS	TRADITIONAL MAINFRAME DSS
• Data and Logic Reside Together	• Data and Formulas Stored Separately
• Crude Data Management	• Sophisticated Data Management
• Awkward Consolidations	• Consolidations Easily Accomplished
• Visual, Worksheet Orientation	• Command Language, Less Visual
• Typically Geographical Reference to Worksheet Cells	• Usually Meaningful Mnemonic References
• Very Easy to Use	• Sophistication Makes Learning Sometimes Difficult
• Simultaneous Relationship Solutions Seldom Available	• Goal Seeking, Targeting Usually Available

INPUT

- Other INPUT studies, for example, <u>Micro-Mainframe Links: European Market Opportunities,</u> INPUT, 1985, have confirmed an overwhelming interest in micro-mainframe links, but have also uncovered a certain vagueness concerning their specific use and vendor application. This situation is, however, now improving as experience is gained.

- The use of an information centre can be relevant in this context. About two-thirds of the users sampled had an information centre organisation, but only about one-third of these (i.e., about 20% of the total sample) claimed to use it to support decision support systems.

- In total, only about one-third of the sample could describe their information centre as well established and actively used.

- Micro-mainframe links are, however, the necessary means to:

  - Build distributed DSS applications.

  - Allow sharing of historical data with large numbers of PC DSS users.

  - Allow organisational DSS to evolve.

- The primary advantages of micro-mainframe links with respect to DSS can be summarised as follows:

  - Ready access to central data by PC DSS users.

  - Productivity and data quality gains, largely from the elimination of manual data input and data duplication.

  - Mainframe offloading.

INPUT

- A mechanism for organising, collecting, and consolidating DSS information from largely independent PC users, a real advantage in budgeting and forecasting applications.

- Despite the hysteria and promise of micro-mainframe links, two realities remain:

  - Manual re-keying of data is by far the most widely used DSS micro-mainframe link.

  - Several major challenges remain before these links are widely implemented.

- These challenges can be summarised as follows:

  - Micro-mainframe links are technically complex due to data base consistency, severity, and data integrity issues.

  - Relatively unsophisticated PC DSS users are probably not yet ready to embrace more complex technology.

  - DSS applications built around these links are dependent on individual organisational factors, requiring traditional systems approaches and longer implementations.

B.   DSS USAGE PROFILE

- Current computer-based decision support system usage can be categorised into three broad groupings:

  - Proprietary DSS packages running on mainframe computers.

- 43 -

INPUT

- Proprietary personal computer-based packages.

- In-house developed systems usually utilising proprietary software packages for specific functions of the system; e.g., linear programming and DBMS.

- Exhibit IV-3 shows the distribution across these categories as analysed from INPUT's survey of users.

- It is interesting to note the relatively high proportion overall (30%) of users who claimed to be using in-house developed DSS.

- The remaining part of the sample was split between:

  - The majority (about 40%) who were using a proprietary mainframe DSS package.

  - Another 30% who were using a proprietary personal computer package.

- Exhibit IV-4 shows the profile of DSS product usage where actual products in use were named by user respondents.

- Users were also asked how many decision support products or services were currently in use in their organisation. Some surprisingly high figures were quoted. At the extreme, one vendor commented, 'Several hundred, mostly developed in-house'.

- Clearly, the term DSS is widely used by many users in its application to different software, as can be seen from the usage profile shown as Exhibit IV-5.

INPUT

EXHIBIT IV-3

USER APPROACHES TO DSS

DSS APPROACH	PERCENT OF RESPONDENTS*				
	FRANCE	ITALY	UNITED KINGDOM	WEST GERMANY	TOTAL
Proprietary Mainframe Package	50%	85%	25%	35%	40%
Proprietary Personal Computer Package	20%	15%	40%	20%	30%
In-House Development	30%	-	35%	45%	30%
Total	100%	100%	100%	100%	100%
Total Number of Responses	10	19	41	15	85

* Rounded to nearest 5%

INPUT

EXHIBIT IV-4

DSS PRODUCTS NAMED BY USERS

PRODUCT	NUMBER OF MENTIONS				
	FRANCE	ITALY	UNITED KINGDOM	WEST GERMANY	TOTAL
FCS	-	5	6	1	12
AS	2	2	-	1	5
SYSTEM W	-	-	3	-	3
MATPLAN	-	-	-	3	3
FOCUS	1	-	1	-	2
IFPS	-	2	-	-	2
SUFICS	-	2	-	-	2
ACUMEN	-	-	2	-	2
EXPRESS	1	-	-	-	1
DEMON	-	-	1	-	1
FINAR	-	-	1	-	1
Totals	4	11	14	5	34

INPUT

EXHIBIT IV-5

USAGE PROFILE:
NUMBER OF DSS PRODUCTS AND SERVICES USED

NUMBER OF DSS PRODUCTS AND SERVICES USED WITHIN ONE ORGANISATION	NUMBER OF MENTIONS
1	3
2	8
3	1
4	1
5	2
6	2
7-10	3
11-20	3
>20	3
Total Number of Responses	26

SE S

INPUT

V DSS MARKET ENVIRONMENT

V   DSS MARKET ENVIRONMENT

A.   TYPES OF USAGE

- This section provides some insights into the areas of use of DSS through an analysis of the user sample researched for this study.

- Respondents were drawn across the four major European country markets from a wide range of industry sectors, but with a preponderance from the manufacturing sector. This is shown in Exhibit V-1.

- Within these diverse organisations, usage of DSS was spread across a number of different departmental areas, but with a strong emphasis, as perhaps would be expected, from users in the planning and analysis function.

- The full distribution of departmental use analysed from the user sample is shown in Exhibit V-2.

- However, it is interesting to note the high proportion, almost equal to the number in 'planning and analysis', that were respondents from the DP department. This is perhaps an indication of the complex nature of the software and the relative difficulty of use for people without DP skills, thus leaving the DP department to run the DSS for the end user.

- 49 -

INPUT

EXHIBIT V-1

INDUSTRY SECTOR ANALYSIS OF RESPONDENTS

INDUSTRY SECTOR	NUMBER OF USER MENTIONS				
	FRANCE	ITALY	UNITED KINGDOM	WEST GERMANY	TOTAL
Manufacturing	11	9	12	11	43
Extractive Industries	2	2	4	3	11
Banking and Finance	1	4	2	1	8
Professional Business Services	-	-	8	-	8
Public Utilities	-	3	1	-	4
Distribution	-	1	3	-	4
Transportation	-	-	4	-	4
Health Care	-	-	3	-	3
Government	-	-	2	-	2
Education	-	-	1	-	1
Other	-	1	5	-	6
Total	14	20	45	15	94

SDSE S

INPUT

EXHIBIT V-2

ANALYSIS OF RESPONDENT DEPARTMENTS

DEPARTMENT	NUMBER OF USER MENTIONS				
	FRANCE	ITALY	UNITED KINGDOM	WEST GERMANY	TOTAL
Planning and Analysis	5	9	10	4	28
Data Processing	9	-	12	6	27
Operational Research	-	-	12	3	15
Finance and Accounting	-	7	3	2	12
Sales and Marketing	-	2	3	-	5
Research and Development	-	-	5	-	5
Administration	-	1	-	-	1
Personnel	-	1	-	-	1
Total	14	20	45	15	94

- In addition to these two categories, which accounted for over half the sample, other significant respondent groups were:

  - Operational research.

  - Finance and accounting.

  - Sales and marketing.

  - Research and development.

- It does seem, therefore, that DSS use for complex mainframe packages is confined to a limited number of types of departments within organisations.

- The use of DSS has, however, largely moved beyond its original entry point of use in financial planning and analysis. For the majority of respondents, DSS use is being extended well beyond this area of activity.

- However, there are still many instances where DSS are used primarily for financial consolidation and allied activities. Two vendors commented as follows:

  - 'We use DSS to consolidate the monthly reports from subsidiaries throughout Europe. Each report comprises some 500 indicators'.

  - 'The program is used for consolidating the accounts of subsidiaries rather than decision support at present, although reports generated are sent to the main board where decisions are made'.

- Use of DSS by types of personnel is relatively evenly spread across the categories of professional staff, middle management, and senior management.

- 52 -

- Use of DSS by more senior executives, e.g., directors, appears to be much more limited, as can be seen from the analysis of use shown in Exhibit V-3.

- Although it is difficult to get respondents to accurately rate levels of management seniority, the general picture emerges of DSS being used in many cases by professional staff or middle management rather than by more senior personnel.

- High rates of usage of DSS were claimed by respondents to INPUT's user survey, with two-thirds of the sample stating that they used their decision support systems frequently.

- The usage pattern, which did not vary much between the different groups, was:

  - Frequent use - 61 (65%).

  - Ocassional use - 14 (15%).

  - Rare use - 5 (5%).

- The remaining 15% of the sample were split between respondents who were planning to use DSS and respondents for whom no use was planned, as follows:

  - Planning to use - 9 (10%).

  - No use planned - 5 (5%).

INPUT

EXHIBIT V-3

MANAGEMENT LEVEL OF DSS USERS

PRODUCT	NUMBER OF MENTIONS*									
	FRANCE		ITALY		UNITED KINGDOM		WEST GERMANY		TOTAL	
	Number	%	Number	%	Number	%	Number	%	Number	%
Directors	2	7%	-	-	10	8%	1	4%	13	6%
Senior Management	3	10%	20	32%	33	28%	6	25%	62	27%
Middle Management	13	45%	22	35%	30	26%	8	33%	73	31%
Professional Staff	11	38%	21	33%	44	38%	9	38%	85	36%
Total	29	100%	63	100%	117	100%	24	100%	233	100%

* Multiple Responses Allowed

INPUT

B.   DATA SOURCES

- Further insight into the use and application of DSS can be obtained from an analysis of the types of information used in making decison and the sources from which they are derived.

- Exhibit V-4 shows an analysis of the information types used for decision making from the subset of 65 users who provided information on this point.

- It can be seen from this exhibit that whilst overall the information types are fairly widely distributed, the predominant types of information are:

    - Financial.

    - Sales.

    - Marketing Data.

    - Costs.

- Clearly, a decision support system must have the capability to draw information from organisational components other than the department from which it is operated.

- Not only must the decision support system obtain internal company data, but it requires data and information from sources external to the user's organisation.

- Exhibit V-5 shows an analysis of responses received to questions on these particular issues.

- 55 -

INPUT

EXHIBIT V-4

TYPES OF INFORMATION USED FOR DECISION MAKING

INFORMATION TYPE	NUMBER OF MENTIONS*	PERCENT
Financial	40	23%
Sales	21	12%
Marketing Data	19	11%
Costs	17	10%
Production	13	7%
Personnel	13	7%
Economic	13	7%
Technical	12	7%
Market Research	11	6%
Administrative	7	4%
Other	8	5%
Total	174	99%

* Multiple Responses Allowed

INPU

EXHIBIT V-5

SOURCES OF INFORMATION FOR DECISION SUPPORT

IN-HOUSE SOURCES	NUMBER OF MENTIONS*	PERCENT
Finance and Accounts	50	19
Data Processing Department	38	14
Subsidiary Company	34	13
Parent Company	30	11
Marketing Department	24	9
Sales and Distribution	23	9
Research and Development	21	8
Personnel	16	6
Other	27	10
Total	**263**	**99**

EXTERNAL SOURCES	NUMBER OF MENTIONS*	PERCENT
Trade Press	29	21
Consultants	25	18
General Press	24	18
Government	17	12
Commercial Data Base	15	11
Trade Association	13	9
Banks and Financial Inst.	13	9
Other	1	1
Total	**137**	**99**

* Multiple responses allowed. Total sample 45.

INPUT

- The most frequently quoted source of information was not surprisingly finance and accounting departments--around one-fifth of all information was derived from this source.

- The next most frequently mentioned category, accounting for one-seventh of the information sources, was the data processing department. About 40% of these users claimed to be automatically transferring at least some data to the DSS. The remainder were having to enter data manually into the system.

- Interestingly, under 10% of the users sampled claimed to have established a data base containing all company information.

- Another important source of information was subsidiary and parent company organisations.

- Information was also obtained in-house from marketing, sales, research and development, and personnel departments.

- External sources of information used for decision-making includes the trade press, consultants, and the general press, each with about one-fifth of the total.

- The remaining categories mentioned accounted for around 10% each. These included government, commercial data bases, trade associations, and banks and financial institutions.

INPU

VI MARKET ANALYSIS AND FORECAST

VI   MARKET ANALYSIS AND FORECAST

A.   FORECAST DEFINITION

- This chapter presents INPUT's forecast for packaged proprietary decision support system products for the five-year forward period 1986-1991.

- It also incorporates a forecast for professional services, e.g., consultancy, training, etc., that are associated with DSS.

- This forecast is provided for the four major country markets of Western Europe, namely, France, Italy, the United Kingdom, and West Germany.

- The forecasts are made in local currency and consolidated in U.S. dollars. All the assumptions made by INPUT concerning currency conversion rates and rates of inflation are given in Appendix B.

- Consequently, local currency growth rates are higher or lower than those calculated in dollars according to the assumed movement of the rates over the forecast timeframe.

- The DSS product categories covered are for mainframe and minicomputers and, as a separate category, personal computer decision support software.

INPUT

- In this forecast, INPUT has set out to determine the market for packaged software that provides a modelling capability as a central facility. As a result, pure spreadsheet packages for personal computers are excluded.

B. MARKET FORECAST

- INPUT forecasts that the market for DSS software products and professional services in the four major country markets of Western Europe will grow from $140 million in 1986 to over $300 million by 1991. This represents an annual average growth rate (AAGR) of about 18%.

- Exhibit VI-1 shows the breakdown of this market (in dollars) between its principal subsectors--mainframe/mini and personal computer software products and professional services.

- Exhibit VI-2 shows a comparison of market size and growth for each of the four individual country markets in dollars together with local currency estimates.

- Exhibits VI-3 through VI-6 show, respectively, the individual country market forecasts in local currency for France, Italy, the United Kingdom, and West Germany.

- From Exhibit VI-2 it can be seen that the United Kingdom market is currently the most developed of these four country markets but will lose out to West Germany by 1991.

- Both the French and Italian markets for decision support software products and professional services are forecast to grow at a higher rate than the U.K. market, 18% and 20% respectively in comparison ot the U.K.'s 15% growth.

INPU

EXHIBIT VI-1

MARKET ANALYSIS AND FORECAST (1986-1991)
WESTERN EUROPE

MARKET COMPONENT	$ MILLIONS		$ MILLIONS		AAGR 1986-1991 (Percent)
	1985	1986	1985	1986	
Software					
Mainframe/ Mini	$55	$71	$86	$113	10%
Personal Computer	$28	41	$70	$136	27%
Subtotal	$83	$112	$156	$249	17%
Professional Services	$22	$29	$42	$70	19%
Total	$105	$141	$198	$319	18%

INPUT

EXHIBIT VI-2

MARKET ANALYSIS AND FORECAST (1986-1991)
COUNTRY MARKET COMPARISON

COUNTRY MARKET		1985	1986	1988	1991	AAGR 1986-1991 (Percent)
France	MFF	170	200	280	450	18%
	$M	21	29	40	63	-
Italy	Lira B	25	30	42	73	20%
	$M	14	20	27	43	-
United Kingdom	£M	28	31	43	64	15%
	$M	40	48	64	91	-
West Germany	MDM	80	96	139	240	20%
	$M	30	44	67	122	-
Total	$M	105	141	198	319	18%

INPU

EXHIBIT VI-3

MARKET ANALYSIS AND FORECAST (1986-1991)
FRANCE

MARKET COMPONENT	FF MILLIONS		AAGR 1985-1986 (Percent)	FF MILLIONS		AAGR 1986-1991 (Percent)
	1985	1986		1988	1991	
Software						
Mainframe/ Mini	FF90	FF100	11%	FF125	FF165	11%
Personal Computer	45	60	33%	FF100	FF190	26%
Subtotal	FF135	FF160	19%	FF225	FF355	17%
Professional Services	FF35	FF40	14%	FF55	FF95	19%
Total	FF170	FF200	18%	FF280	FF450	18%

INPUT

EXHIBIT VI-4

MARKET ANALYSIS AND FORECAST (1986-1991)
ITALY

MARKET COMPONENT	£ BILLIONS		AAGR 1985-1986 (Percent)	£ BILLIONS		AAGR 1986-1991 (Percent)
	1985	1986		1988	1991	
Software						
Mainframe/ Mini	£14.5	£16.5	14%	£21	£30	13%
Personal Computer	£4.5	£6.5	44%	£12	£28	34%
Subtotal	£19	£23.0	21%	£33	£58	20%
Professional Services	£5.5	£6.5	18%	£9	£15	18%
Total	£24.5	£29.5	20%	£42	£73	20%

INP

EXHIBIT VI-5

MARKET ANALYSIS AND FORECAST (1986-1991)
UNITED KINGDOM

MARKET COMPONENT	£ MILLIONS		AAGR 1985-1986 (Percent)	£ MILLIONS		AAGR 1986-1991 (Percent)
	1985	1986		1988	1991	
Software						
Mainframe/ Mini	£14.5	£16.0	10%	£19.0	£22.0	7%
Personal Computer	£7.5	£8.3	24%	£14.0	£26.0	23%
Subtotal	£22.0	£24.3	10%	£33.0	£48.0	15%
Professional Services	£5.9	£6.9	17%	£10.0	£16.0	18%
Total	£27.9	£31.2	12%	£43.0	£64.0	15%

INPUT

EXHIBIT VI-6

MARKET ANALYSIS AND FORECAST (1986-1991)
WEST GERMANY

MARKET COMPONENT	DM MILLIONS		AAGR 1985-1986 (Percent)	DM MILLIONS		AAGR 1986-1991 (Percent)
	1985	1986		1988	1991	
Software						
Mainframe/ Mini	DM38	DM43	13%	DM55	DM80	13%
Personal Computer	DM25	DM33	32%	DM56	DM110	27%
Subtotal	DM63	DM76	19%	DM111	DM190	20%
Professional Services	DM17	DM20	18%	DM28	DM50	20%
Total	DM80	DM96	20%	DM139	DM240	20%

INPU

- Lower growth in the U.K. can be attributed to the relative maturity of the market for DSS in that country, particularly for mainframe-based products. This limits the opportunities for new sales and places emphasis on replacement and enhancement of installed products.

- In the overall market much higher growth is being experienced in the sales of personal computer-based DSS products.

- The comparison with the other sectors can be seen in Exhibit VI-1, which indicates 27% annual average growth in dollar terms over the five-year forecast period.

- The highest rate of growth in this sector (34%) is anticipated in Italy where the market is expanding from a low base and there exists high levels of user interest in DSS approaches.

- INPUT expects the demand for DSS-related professional services to continue strongly up to 1991. Professional services will primarily be consulting and training, but some software development is likely to be involved as well.

- Overall professional services revenues are expected to maintain an overall annual growth rate of 19% in dollar terms (see Exhibit VI-1).

- The Italian and West German markets are forecast to have the highest rate of growth (20%) compared to the other country markets. In absolute terms, West Germany will present the largest opportunity.

- West Germany is expected to become the largest DSS market in Europe by 1988 (see Exhibit VI-2), whilst Italy, despite its high rate of growth, will remain the smallest.

INPUT

VII MARKETING ISSUES

A. MARKETING CHALLENGES

- DSS vendors interviewed by INPUT for this study were requested to express opinions about the marketing challenges which they faced. A range of potential areas of concern were commented upon, and their frequency of mention is shown in Exhibit VII-I.

- The three most important challenges clearly emerged as:

    - User education.

    - The marketing approach.

    - Product positioning.

- The issue of the maturity of the market was really only considered important in the U.K. market. Both technical development and price were not particularly highly rated.

- Each of these issues is discussed in turn below. Technical developments are discussed in the next chapter.

- 69 -

INPUT

EXHIBIT VII-1

MAJOR MARKETING CHALLENGES FOR DSS VENDORS

MARKETING CHALLENGE	PERCENT OF VENDORS*
User Education	70%
Marketing Approach	60%
Product Positioning	50%
Maturity of the Market	30%
Technical Development	25%
Price	20%

* Sample of 33 vendors, rounded to nearest 5%.

INPU

I.   USER EDUCATION

- End user education is considered to be a significant marketing challenge on two counts.

    - Firstly, to convey the real features and benefits of a DSS product.

    - Secondly, to maximise revenues obtained from user education.

- This latter point is particularly important in respect of the increasing need to develop additional revenue streams. As one vendor commented, 'Three years ago training only represented 10% of the total value of a sale; now it represents about 50%'.

- The major problem concerning user education for vendors is in the degree of sophistication of the ultimate end user in respect of DSS knowledge. Typical vendor perceptions of problems were:

    - Users having difficulty distinguishing between a DSS and a spreadsheet.

    - Lack of a DP background for most end users.

    - Resistance from senior managers who do not really want to be an end user of the system.

    - Low level of competence amongst users.

- It is only fair to point out that there does exist a considerable body of sophisticated DSS users in Europe, and some vendors referred to this aspect.

INPUT

2.   MARKETING APPROACH AND PRODUCT POSITIONING

- Marketing approach and product positioning were important concerns for the majority of the vendors interviewed. Market maturity was rated of lower significance within the group, but was clearly seen as a concern within the relatively more developed and consequently more mature U.K. market.

a.   <u>Marketing</u>

- The most frequently occurring marketing concerns mentioned by vendors were:

   - Buyer and user differentiation.

   - Length of the sales cycle.

   - Niche marketing.

- Buyer and user differentiation is needed because all too often the person being sold to, for example, the financial manager, is not the ultimate user of the product.

- Several vendors commented negatively about the role of the DP manager in this connection. For example:

   - 'The DP manager sees DSS as perhaps a litle out of his province'.

   - 'DP personnel don't have a strong understanding of DSS'.

- One vendor pointed out that there generally exists three potential buyers for the product: senior managers, end users, and the DP department; the end users are specialist staff.

- 72 -

INPU

- The concept of the information centre was also gaining strength in Europe, according to one vendor, and this clearly places more buying power into the hands of the DP department.

- All of these factors underline the need for vendors to present the sales of their product across all these possible influencers of the buying decision, recognising that they all have different outlooks and different needs.

- The length of the sales cycle was considered a problem by a number of vendors, as one commented:

  - 'If you sell a generic product, the decision cycle is longer than for an application which fulfills a clearly defined need'.

- A French vendor estimated that the average buying cycle was typically about nine months for their own product. A German vendor pointed out that the sales procedure had to be 'diplomatic' and was certainly a lot longer than in the U.S.

- Niche marketing was also an issue that was frequently mentioned albeit that few vendors had adopted this approach in practice.

- Vendors were specifically questioned as to whether their DSS products were specifically marketed either to particular industry sectors or particular cross-industry applications.

- Althogether some 32 of the 36 vendors interviewed responded to these questions.

- Twenty-eight (28) of these vendors had not adopted a specific niche marketing strategy but marketed their products generally. Instances of specific niche marketing were to:

INPUT

- Manufacturing sector - 3 mentions.

- Distribution sector - 3 mentions.

- Banking and finance - 1 mention.

- Insurance - 1 mention.

• However, despite this general lack of emphasis on specific industry sector marketing, there was high awareness on the part of vendors of greater receptivity to the need for DSS products in some sectors rather than in others.

• Overall, vendors view of use receptivity to DSS for different industry sectors was rated as follows by numbers of mentions:

- Banking and finance   12

- Manufacturing   10

- Extractive industries   8

- Insurance   6

- Distribution   4

- Public utilities   3

- Transportation   2

- Government   2

- Health care   1

- 74 -

- Exhibit VII-2 shows the analysis of vendors' approaches to focused marketing.

- In the past, areas such as planning and analysis and finance and accounting have been the primary areas of focus.

- As the DSS market has matured at the heavyweight (mainframe) end, vendors have needed to seek to give their products or adapt their products to a specific area, e.g., marketing.

- At the moment, it is split approximately 50/50 between the two.

b.   Positioning

- The great profusion of products on the market, particularly large numbers of personal computer-based products, emphasises the need for vendors to place emphasis on product positioning.

- Indeed, several of the vendors interviewed saw this factor as the most important marketing factor.

- Vendors differed, however, in their specific approach to the market dependent upon the particular characteristics of their product. For example:

  - 'Position toward middle managers'.

  - 'Different versions of the product for different functions'.

  - 'Specialised modules needed--it is important that the product should not be integrated'.

  - 'Position toward end-user computing as this is a hot button'.

  - 'Be clear that aim is corporate or econometric modelling'.

INPUT

EXHIBIT VII-2

FOCUSED MARKETING BY DSS VENDORS

MARKETING APPROACH	NUMBER OF MENTIONS*				
	FRANCE	ITALY	UNITED KINGDOM	WEST GERMANY	TOTAL
Specific Marketing	3	5	7	2	17
General Marketing	3	5	4	3	15
Total Vendor Responses	6	10	11	5	32
Specific Marketing Areas:					
Finance & Accounting	2	4	7	2	15
Planning & Analysis	1	5	6	2	14
Marketing	1	2	3	1	7
Sales and Distribution	1	4	-	1	6
Operations Research	2	1	-	-	3
Personnel	1	1	1	-	3
Other	4	2	1	-	7
Total	12	19	18	6	55

* Multiple responses allowed

INPU

- 'We must differentiate between a spreadsheet and a financial modelling package'.

- 'We try to overcome the possible antagonism of more senior managers by calling it a decision foundation tool (IFPS)'.

- This last comment was in the light of a clear recognition on the part of the vendor that senior management resistance was a clear obstacle to sales that needed to be overcome.

c.   Market Maturity

- The level of maturity of the market is also an important issue that was commented upon by a number of vendors, in particular that as markets become more mature, the need for segmentation becomes stronger.

- Essentially, vendors reflected the opinion that the U.K. was a relatively mature market for DSS in comparison to the country markets of France, Italy, and West Germany. One vendor commented, 'The U.K. market is very much more sophisticated and developed than anywhere else in Europe'.

- Consequently, vendors are needing to be more sophisticated in their approach to product positioning and market segmentation.

- As some of the more traditional markets have become relatively automated, vendors are seeking to attack new sections of the market with different sorts of products aimed at new types of users.

- Thus, some vendors are developing specific products to tackle decision making in a number of new areas, such as market data, project control, financial markets following deregulation in the City of London, managing portfolios, fluctuation, etc.

INPUT

- Add in new features like business gaming capability added to modelling elements.

3.   PRICING

- In general, pricing does not appear to be an issue in the market for DSS systems running on large systems. Nearly all vendors reflected the view that in this environment, product features and facilities had far more significance in the sale than the price of the product.

- There were, however, some dissenters from this viewpoint. In particular, one vendor reported the need to discount DSS packages as being a significant feature in their sales activity.

- Of course, this reflects the marketing position taken by a software vendor, whether the product has the superior features that justify a high value approach or whether a more utility product must be sold on a low price basis.

- Specialised products aimed at a specific niche are likely to be priced on a high-value basis and consultancy becomes much more important for this type of sale. The position was summed up by one vendor who commented:

    - 'Niche marketing commands a higher price but the cost of pre-sales consultancy is very high--this limits us to multiple sales in large firms'.

- The issue of modular pricing was raised by one vendor. This can help considerably to present an initial lower price threshold and to extend the effective available marketplace for a product.

- At the PC end of the market, pricing becomes a much more important issue because of competition from basic spreadsheet packages.

INPU

- DSS vendors are marketing products which are sophisticated and almost certainly need some significant level of consultancy support or training. Consequently, the price of the product must reflect this.

- One vendor summed up the situation as:

  - 'Pricing is a real problem. The cheapest PC product (a spreadsheet used as a DSS) is $300--the nearest compatible proper DSS product costs $1,500 and will fill a 10Mb disk. How, therefore, do we price our product to enter this market'?

- In order to establish some common comparison across different product segments, one vendor has adopted a 'per seat' pricing policy. That is to say, the effective end-user price remains relatively constant irrespective of the product delivery mode.

- Given the necessary support needs commented upon by most vendors and the universal need to develop ongoing revenues, it is probably essential that vendors emphasise annual update or maintenance contracts (one vendor quoted these at 75% of the original one-off price) within which ongoing maintenance is provided to the client.

B.   MARKET DIRECTIONS

1.   DRIVERS AND INHIBITORS

- In order to obtain some insight into those factors which are potentially driving or inhibiting the market for packaged DSS products, vendors were questioned about their specific views on the forces shaping the market.

INPUT

- In addition, users were questioned about how decision support systems had affected their organisation and whether they had experienced any problems with their use.

- Exhibit VII-3 lists a series of items considered to be driving forces for the market by vendors.

- It can be seen from this list that the various factors mentioned can be classified into two broad groups:

  - Business/management factors.

  - Technical factors.

- The changing conditions of the management task is in the view of a number of vendors placing increased emphasis on using DSS systems.

- Thus, comments about 'management's need to control more and better information' and 'a trend toward more centralised, smaller management groups' are evidence of an awareness by vendors that there are changes occurring in the way organisations are managed and that these can be significant in raising demand for DSS products.

- Other business/management factors mentioned by vendors and not included in Exhibit VII-3 were:

  - Higher turnover in senior management.

  - Increasing sophistication practiced in the conduct of business and assessment of markets.

  - A need for better quality decision making.

INPU

EXHIBIT VII-3

MARKET DRIVING FORCES - VENDOR VIEWS

FACTOR	NUMBER OF MENTIONS*
Awareness of "spreadsheet' products	9
"End-user' system development capability	5
Management's need to control more and better information	3
A trend towards more centralized, smaller management groups	3
The trend from 'Data' to 'Information' processing	2
The need for companies to respond quickly to market changes	2
The ease of development	2
PC implementation	2
Availability of micro-mainframe links	2
Availability of user interface improvements, e.g., graphics, windows	2
Easy data entry	2
Demand for integrated solutions	2

* Multiple responses allowed.

INPUT

- The most frequently mentioned market drivers were, however, 'technical' factors such as the wide awareness of spreadsheets and the widespread ue of 'end-user' system development capability.

- Factors mentioned only once, and therefore not included in Exhibit VII-3, that fall into this group were:

    - The use of information centres.

    - Departmental systems.

    - Widespread use of office automation.

    - Use of networks.

- Inhibiting factors on the DSS market mentioned by vendors are listed in Exhibit VII-4.

- Some further perspectives on market driving forces were obtained from user responses to the question on effects of the introduction of DSS to their organisations.

- Primarily, these were positive and an analysis of these responses is shown in Exhibit VII-5. Only those mentioned more than once are shown here--single mentions were given to:

    - Greater access to planning systems by senior management.

    - Manipulating enormous data bases.

    - Better report production.

    - Standardisation of techniques.

    - Increased profits.

- 82 -

EXHIBIT VII-4

MARKET INHIBITORS - VENDOR VIEWS

- Lack of awareness by users.

- Price.

- Lack of integration of modules increases difficulty in using.

- General products that are not sufficiently focused to specific application needs.

- People reacting against new ideas.

- Product confusion over development tools and fourth generation languages.

- Heavy use of processing resources.

- Cost of consultancy and training.

- More complex products and wider choice in the market lead to a longer sales decision cycle.

- Level of implementation effort required.

- Real need for DSS restricted to larger users.

- Corporate culture alien to DSS methods.

- Confusion amongst users caused by technological change.

INPUT

EXHIBIT VII-5

POSITIVE EFFECTS OF DSS - USER VIEWS

EFFECT	NUMBER OF MENTIONS*
Increased Productivity	29
Better Quality Decisions	10
Improved Understanding of Company Operation	7
'What If' Facilities	6
Conducting Previously Impossible Analyses	5
Reduction in Reaction Time for Decision Taking	4
Fine-Tuning Long-Term Planning Decision	3
Increased Range of Possibilities	2

* Multiple Responses Allowed

INP

- This list indictes the kinds of emphasis and postioning that vendors should pay attention to.

- Negative comments by users were concerned with:

  - Cash.

  - Complexity.

  - Compatibility.

  - Lack of computer literacy amongst 'decision makers'.

  - DSS packages being too general.

  - Working practices do not allow the use of DSS.

  - Too much emphasis on computer systems--not enough on the problem.

- Users were also asked to state what problems they had encountered. The most frequently mentioned problems were:

  - Lack of computer skills amongst potential users.

  - Management awareness; lack of willingness on the part of managers.

- A number of other problems were mentioned by users which included:

  - Lack of good documentation.

  - Cost.

  - Technical deficiencies.

INPUT

- Lack of user coordination.

- Heavy use of computer resources.

- Data entry.

2. PRODUCT FEATURES

- Important considerations for any vendor are the positioning of a product, selection of most suitable target markets, and subsequently product enhancements designed to extend the appeal and potential market coverage of a product.

- Consequently, the importance of product features to users, whether capabilities or enhancements, is of considerable significance.

- Further, there exists the consideration as to whether vendors as a group view the importance of various product features differently from users.

- Exhibit VII-6 shows a comparison between user and vendor ratings of DSS product features. In each case, both groups were asked to rate each feature as being vital, important, useful, or unnecessary. In all cases, 'don't know' was interpreted as unnecessary and included in this classification.

- It can be seen from Exhibit VII-6 that there exists a general commonality of views between users and vendors on the importance of these various product features.

- Both groups, for example, rate the following features highly:

  - Ease of use.

  - Ease of learning.

- 86 -
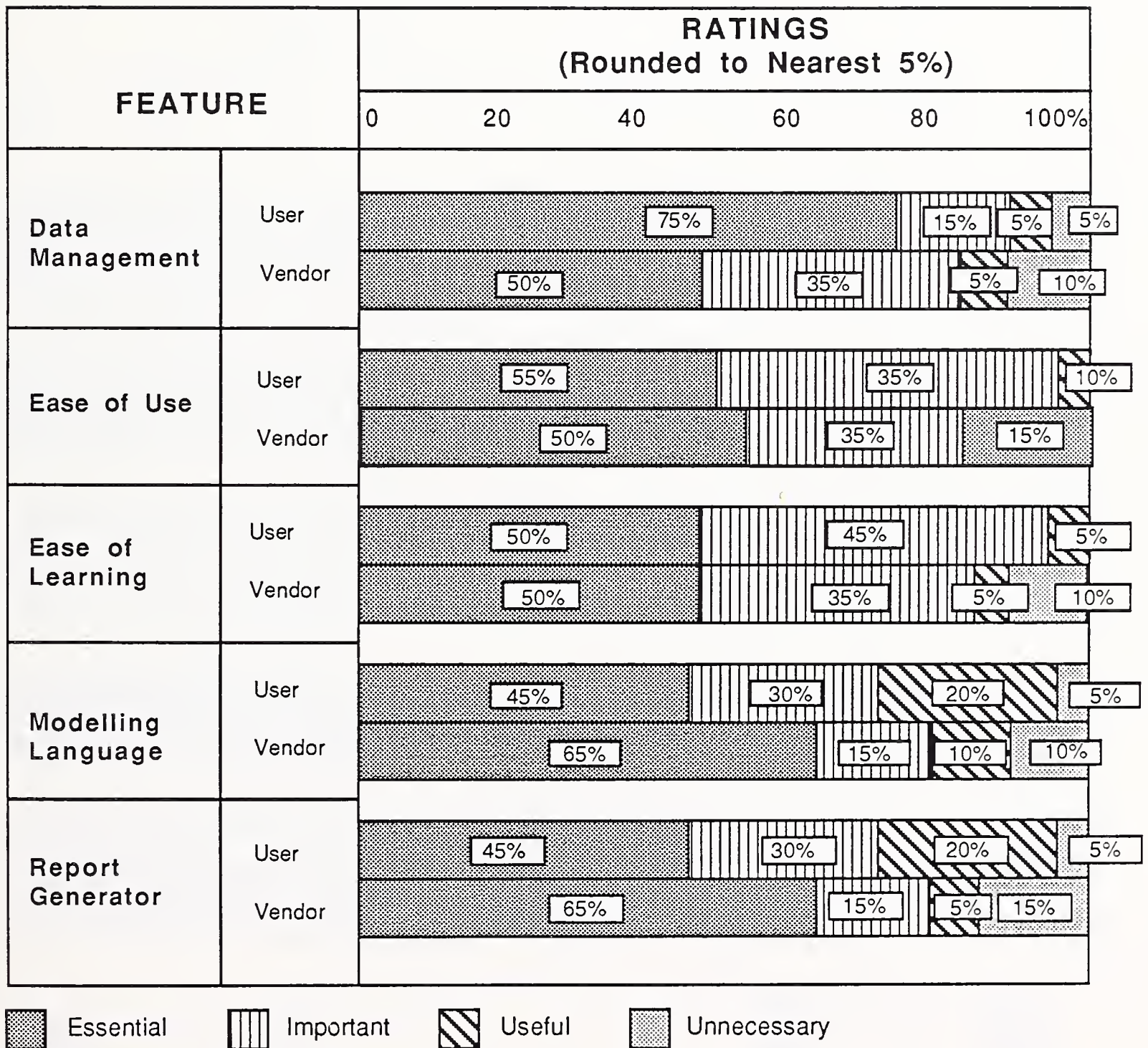
INPU

EXHIBIT VII-6

USER AND VENDOR RATINGS OF
DSS PRODUCT FEATURES

FEATURE		RATINGS (Rounded to Nearest 5%)
Data Management	User	Essential 75% / Important 15% / Useful 5% / Unnecessary 5%
	Vendor	Essential 50% / Important 35% / Useful 5% / Unnecessary 10%
Ease of Use	User	Essential 55% / Important 35% / Useful 10%
	Vendor	Essential 50% / Important 35% / Unnecessary 15%
Ease of Learning	User	Essential 50% / Important 45% / Useful 5%
	Vendor	Essential 50% / Important 35% / Useful 5% / Unnecessary 10%
Modelling Language	User	Essential 45% / Important 30% / Useful 20% / Unnecessary 5%
	Vendor	Essential 65% / Important 15% / Useful 10% / Unnecessary 10%
Report Generator	User	Essential 45% / Important 30% / Useful 20% / Unnecessary 5%
	Vendor	Essential 65% / Important 15% / Useful 5% / Unnecessary 15%

Legend: ▨ Essential   ▥ Important   ▨ Useful   ▨ Unnecessary

INPUT

EXHIBIT VII-6 (Cont.)

USER AND VENDOR RATINGS OF
DSS PRODUCT FEATURES

FEATURE		RATINGS (Rounded to Nearest 5%)
		0 20 40 60 80 100%
Vendor Support	User	40% 45% 15%
	Vendor	30% 30% 10% 30%
Graphics	User	35% 25% 30% 10%
	Vendor	30% 45% 15% 10%
Micro-Main-frame Links	User	30% 30% 30% 10%
	Vendor	40% 40% 15% 5%
Financial Consolidation	User	30% 25% 15% 30%
	Vendor	55% 15% 20% 10%
Forecasting Capability	User	25% 30% 30% 15%
	Vendor	25% 40% 20% 15%

Essential ▨ Useful

Important ▨ Unnecessary

INPU

EXHIBIT VII-6 (Cont.)

USER AND VENDOR RATINGS OF
DSS PRODUCT FEATURES

FEATURE		RATINGS (Rounded to Nearest 5%)
High Processing Speed	User	Essential 25%, Important 35%, Useful 30%, Unnecessary 10%
	Vendor	Essential 20%, Important 35%, Useful 25%, Unnecessary 20%
Financial Functions	User	Essential 20%, Important 40%, Useful 30%, Unnecessary 10%
	Vendor	Essential 30%, Important 50%, Useful 10%, Unnecessary 10%
System Operates Within a Network	User	Essential 20%, Important 30%, Useful 25%, Unnecessary 25%
	Vendor	Essential 15%, Important 30%, Useful 35%, Unnecessary 20%
Access to External Data Bases	User	Essential 15%, Important 30%, Useful 45%, Unnecessary 10%
	Vendor	Essential 30%, Important 20%, Useful 40%, Unnecessary 10%
Open Architecture to Other SW	User	Essential 15%, Important 45%, Useful 25%, Unnecessary 15%
	Vendor	Essential 5%, Important 50%, Useful 25%, Unnecessary 20%

Legend: Essential, Useful, Important, Unnecessary

INPUT

EXHIBIT VII-6 (Cont.)

USER AND VENDOR RATINGS OF
DSS PRODUCT FEATURES

FEATURE		RATINGS (Rounded to Nearest 5%)
		0 20 40 60 80 100%
Economic Use of Resources	User	15% 50% 15% 20%
	Vendor	10% 45% 30% 15%
Statistical Functions	User	15% 45% 35% 5%
	Vendor	15% 30% 50% 5%
Operations Research	User	10% 25% 35% 30%
	Vendor	10% 20% 50% 20%
Word Processing	User	5% 20% 30% 45%
	Vendor	5% 40% 55%

Essential Useful
Important Unnecessary

INPU

- There also seems to be widespread agreement between users and vendors on the lack of importance attached to such features as:

  - Word processing.

  - Operations research.

  - Statistical functions.

  - Economic use of resources.

- However, the ratings do highlight some areas where users and vendors do appear to place a different level of significance on a feature, and these should be examined by vendors carefully when considering product enhancements and the targeting of markets.

- Divergences of opinion between users and vendors were most marked on the following features:

  - Data management.

  - Modelling language.

  - Report generator.

  - Financial consolidation.

  - Access to external data bases.

- In the case of data management, this feature was rated as vital by 75% of the users but only by 50% of the vendors.

INPUT

- Modelling languages and report generators were both considered vital by 65% of the vendors but by only 45% of the users.

- Financial consolidation was rated as vital by over 50% of all vendors but only by 30% of the users.

- Access to external data bases was rated as vital by 30% of all vendors but by only 15% of the users.

3.   PRODUCT SELECTION CRITERIA

- In order to gain some insight into the kinds of considerations undertaken by users when evaluating decison support software, users were asked to rank a number of criteria in order of importance.

- Exhibit VII-7 shows the analysis of the results of this question.

- Users placed 'use of the system on approval' clearly in first place followed by:

    - Documentation.

    - Vendor reputation.

    - Demonstration.

    - Technical consulting capability of vendor.

    - Client references.

- Criteria such as price, hotline support service, a benchtest, and training were all clearly of lower significance to most users.

INPU

EXHIBIT VII-7

USER SELECTION CRITERIA

SELECTION CRITERIA	PERCENT OF RANKINGS*					
	(1 = Most Important, etc.)					
	1	2	3	4	5	6-10
Use of the System on Approval	25%	10%	5%	10%	10%	40%
Documentation	15%	20%	15%	5%	15%	30%
Vendor Reputation	15%	10%	15%	10%	15%	35%
Demonstration	10%	15%	-	20%	10%	45%
Technical Consulting - Vendor Capability	10%	10%	15%	15%	5%	45%
Client Reference	10%	10%	10%	10%	-	60%
Price	5%	10%	5%	10%	20%	50%
Hotline	5%	5%	15%	10%	-	65%
Benchtest	5%	5%	10%	-	10%	70%
Training	-	5%	10%	10%	15%	60%
Total	100%	100%	100%	100%	100%	-

* Rounded to Nearest 5%. User Sample 40.

INPUT

- In addition to the criteria mentioned above, some other buying criteria were highlighted by users as being of significance in their purchasing decisions.

- These criteria included:

  - Functionality of the system.

  - Availability of the software on a wide variety of hardware.

  - The power and flexibility of the reporting and/or query language.

  - Compatibility and portability.

- 94 -

INPU

VIII FUTURE DEVELOPMENT

VIII   FUTURE DEVELOPMENT

A.   DSS APPLICATIONS GROWTH

- INPUT's observation from this study is one of continued growth in already established applications such as planning and analysis, as well as new industry and function-specific applications stimulated particularly by artificial intelligence developments.

- Additionally, advances in communications networks and micro-mainframe linkages should further stimulate growth, particularly in larger organisations.

- INPUT forecasts that vendors, either alone or through partnerships, will increasingly integrate DSS software with:

  - Other operational applications.

  - Office system software such as electronic mail and EDI (Electronic Data Interchange).

- Broadening DSS applications, from a vendor's perspective, is most easily achieved by the integration of DSS software into other operational applications. Financial and transactional systems offer the most realistic and practical potential. Several factors will drive this.

- 95 -

INPUT

- Traditional DSS dependence on actual financial (accounting) data.

- Increasing frequency of planning and its related comparison with actual results.

- Relatively well-defined, large applications that exist today.

- The ability of DSS software vendors to develop partnerships with other vendors with relatively little investment of resources.

- Productivity benefits of data sharing, which are easily perceived by users familiar with manual data input.

- Probably the best practical example of integrated transactional DSS application is depicted in Exhibit VIII-1.

- In this example, corporate accounting systems are maintained by a standard financial accounting package which typically includes transaction processing, reporting, and possibly budget reporting (but not budget development capability).

- Because the nature of accounting systems is well defined and structured, the task of integration with DSS modelling tools is confined to a relatively few issues of data compression/explosion. Once the data gateway is described in generalised interfaces, the environment exists for rapid development and implementation of integrated financial DSS applications.

- The perceived benefits, from a user's perspective, in this example would be:

  - Relatively well-defined applications development environment.

  - Immediate productivity and data quality gains.

INPU

EXHIBIT VIII-1

EXAMPLE OF INTEGRATED FINANCIAL DSS APPLICATION

INPUT
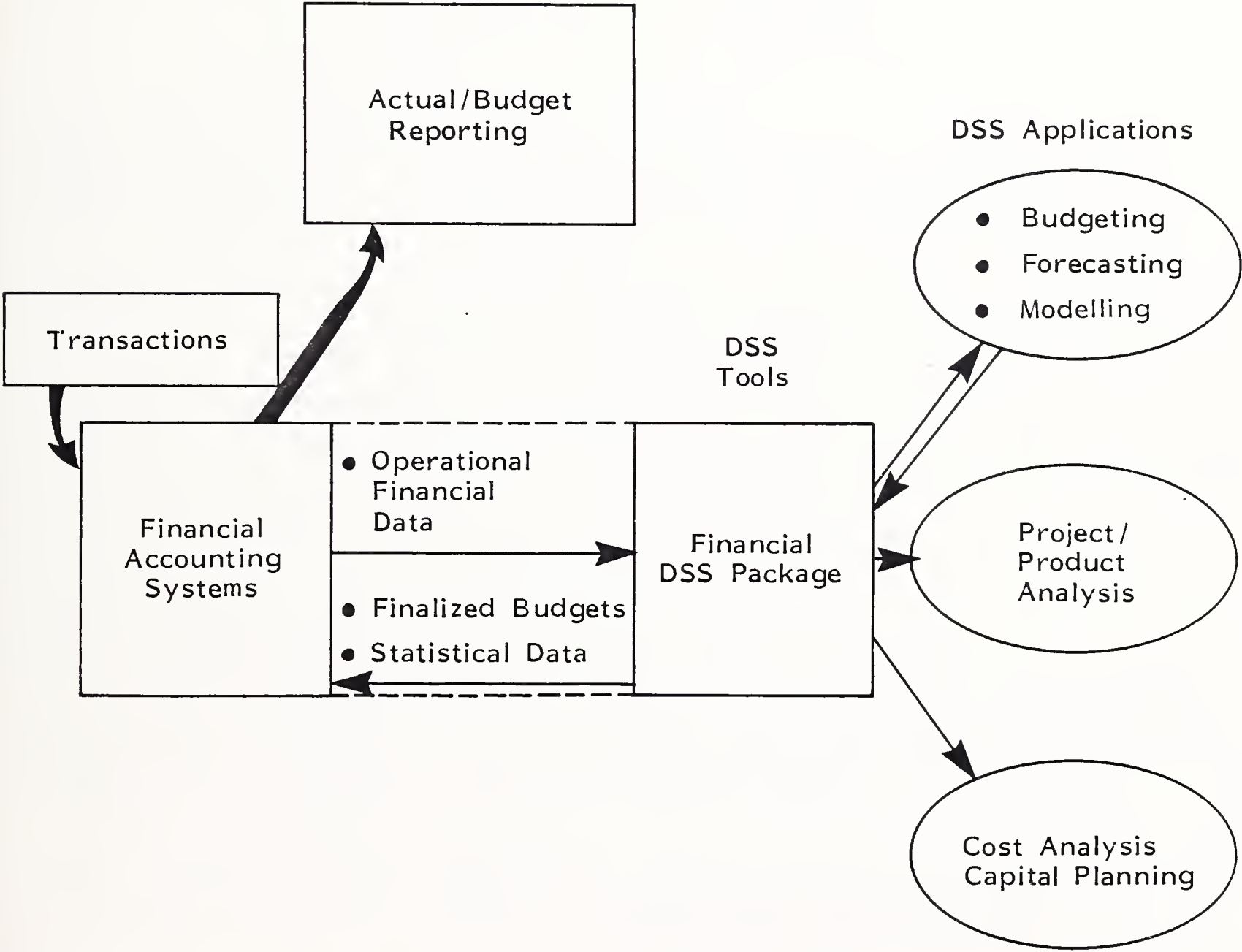
- Manufacturing systems will provide a great deal of potential for DSS applications growth, especially in integration of analysis tools within specific existing software processing functions such as:

  - Inventory management.

  - Financial functions (accounts receivable, sales analysis, forecasting).

  - Plant simulation.

- The service industry, with its diverse business categories and sizes, will see attention given to it by software vendors already addressing a particular segment with products other than DSS. These segments include:

  - Engineering firms for project management.

  - Accounting firms for auditing and statement analysis.

  - Medical diagnosis systems.

  - Hospital capacity planning and analysis.

  - Construction companies for project planning and forecasting.

- The deregulation taking place in the City of London may create particular opportunities for DSS software in the banking and financial services sector.

- Another potential applications area already commented upon is that of marketing decision supprot systems.

- The challenge to marketing and sales management in fast-moving consumer goods (FMCG) markets to analyse data quickly to draw conclusions and act upon them is already taken up by some DSS vendors.

INPU

B. MAINFRAME AND MINI DSS TRENDS

- A number of key decision support trends are developing which will have a significant impact on the direction and nature of DSS products on mainframes and minicomputers.

  - Focus on data management and data acquisition.

  - Ongoing quest for 'friendlier' software.

  - Integration with other applications.

  - Micro-mainframe links.

  - Traditional DBMS products moving into DSS.

  - Continued expansion to other hardware.

  - Incorporation of artificial intelligence technology.

- These trends are the result of several factors:

  - Recognition that data is going to play an ever-increasingly critical role in DSS.

  - A focus on user needs.

  - An effort to reach the executive decision maker.

  - Significant vendor investment in existing software.

  - A realisation that personal computer-based DSS have arrived.

INPUT

- Data management and acquisition will be an important factor in determining the direction of DSS products. Although this issue transcends products and has much to do with organisational and end-user factors, DSS vendors have been quick to react to what they believe are the needs:

  - Micro-mainframe links.

  - Heavy promotion of data management capabilities.

  - Adding data handling functionality.

  - DBMS vendors taking a more aggressive DSS posture.

- 'User friendly' is a much overused term but it is clearly becoming of considerable importance to both users and vendors, as was shown in Exhibit VII-6 in the previous chapter. The importance of user friendliness is based on the assumptions that:

  - If a product is not easy to learn, it will not be widely accepted.

  - There is a generation of PC spreadsheet users ready for more DSS power, but with expectation levels based on user-oriented PC software.

  - 'Friendly' software sells into organisations more easily.

- As discussed in Section A of this chapter, there is a distinct trend for DSS tools to become integrated with specific applications. This can be accomplished by:

  - Having application products include specific DSS functions.

INPUT

- DSS vendors partnering with or making their products compatible with widely used applictions or DBMS systems.

- Offering traditional DSS products in industry or functional 'template' versions.

● This trend is a response to the generally greater difficulty and longer sales cycle associated with generic products. Vendors find that their products are more easily marketed when driven by specific applications that users can relate to.

● Micro-mainframe links are becoming available in conjunction with PC versions of mainframe/mini software or as separate add-ons. They range in function from simple terminal emulation and communications to more complex intelligent data transfer mechanisms.

● It was seen in the previous chapter (see Exhibit VII-6) that both users and vendors consider this an important element of DSS systems; vendors actually placed more emphasis on it than the users.

● Although not thought of as DSS in a classic sense, traditional DBMS vendors are taking a broader definition of DSS and actively marketing their products under that umbrella. With user needs now focusing on the importance of data organisation, data acquisition, and integration capabilities, vendors make up for their general lack of specific DSS functions.

● DBMS vendors are taking advantage of most DSS products' inherent weaknesses in the data management area. They tend to view spreadsheets as the modelling and analysis tool and their products as the overall mechanism for integrating systems and providing data as well as linking micro and mainframe users.

INPUT

- Demand is increasing for solutions which allow the implementation of a single product across mixed vendor hardware and across different combinations of mainframe, mini, and micro-based processor. Larger organisations recognize the need to standardize systems across departments and business units and the support costs of maintaining multiple DSS products on different hardware.

- The incorporation of artificial intelligence technology into DSS products is discussed in Section D below.

C.   MICROCOMPUTER DSS TRENDS

- There are many developing trends in microcomputer DSS products; in some ways they parallel or mirror trends evolving in the mainframe and mini environment.

    - Full-function PC versions of leading mainframe/mini DSS packages are becoming more significant.

    - Spreadsheets are moving toward 'mainframe' functionality.

    - Applications and DSS 'templates' are finding acceptance.

- Factors that have and will continue to influence the direction of micro-computer decision support products include:

    - More powerful processors with greater storage capabilities.

    - A rapidly growing user base.

    - Increasing user sophistication and capability.

- 102 -

INPUT

- The user view of DSS as a specific application.

- Need for access to a wide variety of data sources.

- Vendors (as opposed to users) providing much of the direction for products.

- Many of the leading mainframe/mini DSS products are, or will be, offered on the personal computer largely intact. This may be due not as much to the potential exploitation of the PC base as to the establishment of a foothold for accomplishing longer-term objectives. This trend should continue as vendors attempt to:

  - Offer a product to sophisticated spreadsheet users with nowhere to go.

  - Integrate their product line on all types of processors.

  - Gain exposure and acceptance for future mainframe/mini sales.

- Packages such as IFPS/Personal and PC Empire typically provide functionality very close to that available on the mainframe, but by their very nature do not have the easy-to-learn/use orientation inherent in spreadsheets.

- Spreadsheet and integrated microcomputer software vendors recognise that users are becoming more proficient with their products and that there is an upper limit to the capabilities of spreadsheets in dealing with advanced DSS functional requirements and multidimensional or multisource data.

- PC software vendors are very aware of the potential of mainframe/mini vendors to attract these sophisticated and possibly frustrated users. To address this, spreadsheets/integrated packages are evolving into areas that rival the functionality of mainframe DSS counterparts.

INPUT

- Increased data management capabilities.

- Additional functionality such as goal seeking, regression, and statistical analysis.

- The increasing power and sophistication of DSS and DBMS software will continue to stimulate functional and industry-specific applications product versions, thus paralleling a trend evident in the mainframe/mini DSS environment.

D.   DSS AND ARTIFICIAL INTELLIGENCE

- This section provides a brief review of artificial intelligence in its relation to and impact on decision support systems. For a more detailed review of AI developments in Europe, see INPUT's report Artificial Intelligence - European Market Opportunities, 1986.

- This is clearly an area of importance for product development amongst DSS software vendors. INPUT's user survey indicated a quite high level of interest amongst users; about 60% of the users interviewed reported that they were reviewing the possible use of expert systems.

- The two most relevant AI developments for DSS are the areas of:

- Natural language interfaces.

- Expert systems.

- Natural language interfaces usually have the capability to understand conversational English, to consistently respond to differently worded questions, and to resolve ambiguities in requests. They can serve as both

- 104 -

INPUT

front-ends to DBMS applications such as corporate data bases and an easily learned interface for ad hoc retrieval requests.

- Expert or knowledge-based systems are computer-based systems which operate, typically without decision structure, to formulate conclusions based on learned rules. The current practical business implementations are primarily in narrowing defined expertise areas such as:

  - Problem diagnosis.

  - Scheduling and assignment.

  - Management decision aid.

- It is useful to compare traditional DSS systems with expert systems. Traditional decision support system characteristics are as follows:

  - User must draw own conclusion from DSS results.

  - Solution sought is usually specific.

  - Assumptions are usually mathematical.

  - System cannot 'learn' from experience.

- Expert systems, on the other hand, display a different set of attributes.

  - System draws conclusions, interprets results.

  - The system starts with little knowledge, builds with later decisions.

  - Nature of solution sought may be unknown or very general.

  - Assumptions and data may be unstructured and incomplete.

INPUT

- Natural language and knowledge-based systems both share similar broad objectives in their organisational use; that is, to make management more efficient and productive in decision making. The outlook for these artificial intelligence tools to provide these gains is unclear, but one important conclusion can be put forward:

  - Natural language user interfaces may be the next step in the evolution of 'friendly' DSS software, providing front ends for DBMS languages and possibly assisting in defining assumptions and algorithms in modelling-oriented languages. Whether or not they reach a new target of managerial users rests in large part on the organisational effort made in marketing it to new users.

- The use of artificial intelligence in strategic decision making will experience a longer range evolution due to a combination of technological and organisational factors.

  - The kinds of support required for these types of decisions are beyond the proven core of AI technology.

  - Computer processing power requirements are relatively high.

  - There is a high degree of reliance on high volume, variable, and sometimes unrelated data.

  - Resource requirements to develop these systems to aid in specific decisions may outweight their value.

- Although AI is seen by many as one of the most important long-range decision support product trends, few traditional mainframe and minicomputer DSS software vendors are racing to apply artificial intelligence to their products on a large scale. AI applications will take time to develop due to some very high risk factors that few DSS vendors are likely to take a chance on all at once, for example:

- 106 -

INPUT

- Unknown benefit.

- User commitment and acceptance unclear.

- High investment required.

- Applications somewhat limited.

- Relative infancy of technology.

- Long development lead times.

- Most of the current product development in DSS with respect to artificial intelligence is taking place in the user interface area with natural language front-end processors, particularly in ad hoc data retrieval applications.

- From a practical DSS user's standpoint, there is significantly more artificial intelligence-related software available on personal computers than on mainframe and minicomputers. These packages are typically not traditional general analysis and modelling-oriented software, but are closer to decision aid or expert systems.

- The micro-based artificial intelligence software suffers under the same set of evolutionary constraints as found on larger systems when thought of in terms of traditional DSS applications.

- Recent partnerings of PC-based DSS software vendors such as that announced between Lotus Development Corporation and McCormack & Dodge highlights a trend also worth watching. In an effort to be included in organisational DSS solutions, PC software vendors are being motivated to integrate directly to mainframe applications products rather than cooperating with their new, mainframe-rooted, DSS competitors.

INPUT

E.   DSS LIFE CYCLES

- A market is generally considered to be mature when some of the following characteristics apply:

    - There exists considerable competition to achieve market share.

    - Sales are predominantly for replacement or upgrade purposes.

    - Cost and service issues are emphasised.

    - Limits are met in developing new products and applications.

- One of the observations made by INPUT about the DSS market is its relative maturity, particularly in the U.K. One vendor remarked that the U.K. market was more developed and sophisticated than elsewhere in Europe.

- A number of DSS vendors interviewed by INPUT made references to the relative maturity of this market.

- One vendor considered that the market was becoming more mature in France. In contrast, Italian vendors referred to the lack of maturity in Italy. Some comments were:

    - 'In Italy, the market isn't mature'.

    - 'Italian companies are already full of problems in traditional EDP--but these are the conditions for a rapid expansion of the DSS market'.

- The level of maturity of the market and the consequent emphasis on upgrade and replacement sales raises the issue of the life cycle of DSS products.

INPUT

- Typical vendor comments on DSS product life cycles were:

  - 'Our mainframe DSS is updated every six months--the method of tackling a problem is constantly evolving'.

  - 'The life cycle is becoming shorter with more product innovation necessary'.

- A shortening of the life cycle for software is a generic factor throughout the industry. At earlier stages of development software products had a useful life lasting a number of years. Now with many vendors and potential vendors in the market, more advanced software is rapidly appearing making earlier products quickly obsolete, particularly in the PC software segment.

- The life expectancy of software has decreased so significantly that it is now anticipated that an entirely new set of DSS software products will be produced within a five-year period.

- Vendors of mainframe software products quoted anticipated life cycles of up to five years with updates being issued as frequently as every six months.

- At the opposite end of the market, personal computer-based DSS vendors talked in terms of two-year life cycles, again with updates being introduced every six months.

©1986 by INPUT. Reproduction Prohibited.

INPUT

APPENDIX A: RESEARCH SAMPLE ANALYSIS

APPENDIX A: RESEARCH SAMPLE ANALYSIS

- User research was carried out through the medium of a mailed self-completion questionnaire in the United Kingdom and by means of a telephone survey in France, Italy, and West Germany.

- Vendor research was conducted by means of both personal face-to-face interviews and telephone interviews.

- Exhibit A-1 shows the analysis of these interviews across the four country markets studied.

INPUT

RESEARCH SAMPLE ANALYSIS

COUNTRY	USER	VENDORS
France	14	6
Italy	20	12
United Kingdom	45	13
West Germany	15	5
Total	94	36

SDSE Jd

INPUT

APPENDIX B: ASSUMED CURRENCY EXCHANGE RATES

APPENDIX B: ASSUMED CURRENCY EXCHANGE RATES

- Forecasts have been made in local currency and converted into U.S. dollars for aggregation and comparative purposes.

- The forecasts include assumptions about the rate of inflation in each country as follows:

    - France - 4.0%.

    - Italy - 6.0%.

    - United Kingdom - 5.0%.

    - West Germany - 1.5%.

- In order to maintain a fair comparison between the different country markets throughout the five-year forecast period, the U.S. dollar conversion rates used have been adjusted to reflect the assumed differences in inflation rates.

- U.S. inflation was assumed to be 3.5%.

- Exhibit B-1 sets out the assumed conversion rates used in preparing this forecast.

INPUT

ASSUMED U.S. DOLLAR CONVERSION RATES
$1 =

CURRENCY	1985	1986	1988	1991
French Francs	8.00	6.99	7.06	7.16
Italian Lira	1,770	1,492	1,567	1,688
Pounds Sterling	0.7	0.65	0.67	0.70
Deutsche Marks	2.62	2.18	2.09	1.97

- In no regard should these conversion rates be interpreted as a forecast of exchange rates. They are calculated on the basis of prevailing exchange rates and used simply as an index to eradicate distortions that would otherwise arise as a result of the use of different inflation assumptions for different countries.

INPUT

APPENDIX C: USER QUESTIONNAIRE

APPENDIX C

"Decision Support Systems in Europe"

User Questionnaire

Respondent Name: _____

Title: _____

Company: _____

Address: _____

_____

_____

Telephone: _____

Number of Employees: _____

Turnover 1984-1985: _____

Financial Year Ends: _____

INPUT

1   Please indicate the industry sector in which your company
    operates.

Banking & Finance   [ ]   Transportation   [ ]

Insurance & Reinsurance   [ ]   Professional Business Services   [ ]

Manufacturing   [ ]   National Government   [ ]

Public Utilities   [ ]   Health Care   [ ]

Wholesale Distribution   [ ]   Extractive Industries   [ ]

Retail Distribution   [ ]   Other? _____   [ ]

2. Please indicate the type of Department in which you are currently
    working.

Planning & Analysis   [ ]   Research & Development   [ ]

Operation Research   [ ]   Finance & Accounting   [ ]

Sales and Distribution   [ ]   Legal   [ ]

Marketing   [ ]   Administrative   [ ]

Engineering   [ ]   Personnel   [ ]

Scientific   [ ]   Other?   [ ]

3. Would you describe the decisions you make as being predominantly:

    (a) Strategic   – deciding the long-term goals of the
                         company?   [ ]

    (b) Tactical   – deciding on the methods to be used
                         to achieve long-term goals?   [ ]

    (c) Operational – decisions concerning the detailed
                         implementation of the chosen methods?   [ ]

- 118 -

INPUT

4. Please describe the main types of information which you use in the decision making process. e.g., Production, Sales, Financial etc.

A _____

B _____

C _____

D _____

5. Please indicate the sources of this information with a tick (✓):

	D	C	B	A
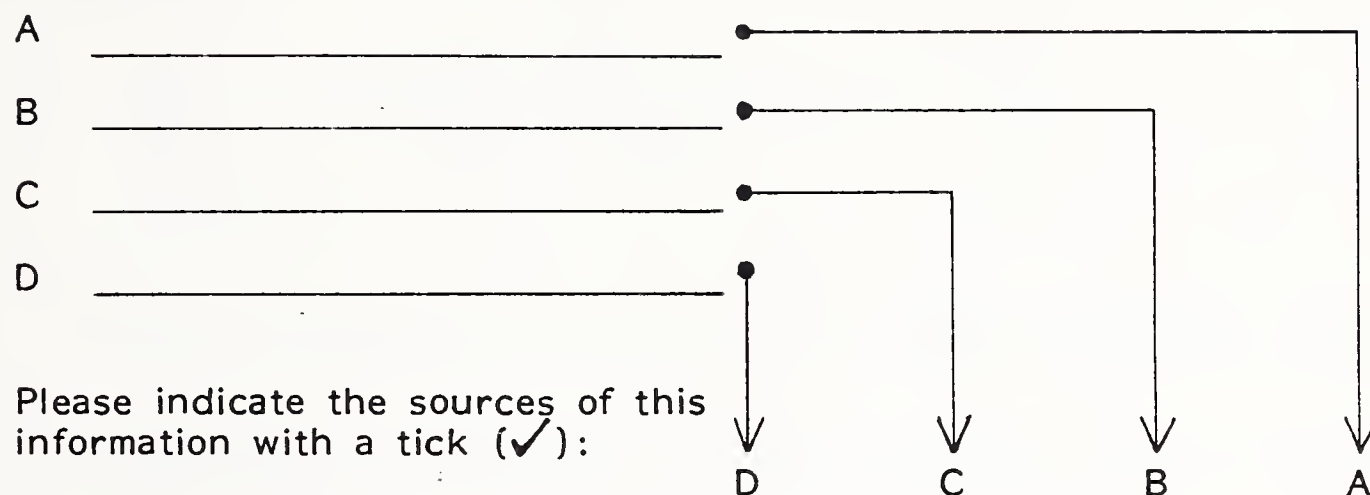
IN-HOUSE SOURCES:

	D	C	B	A
Parent Company	☐	☐	☐	☐
Subsidiary Company	☐	☐	☐	☐
Operations Research Dept.	☐	☐	☐	☐
Data Processing Dept.	☐	☐	☐	☐
Finance Dept.	☐	☐	☐	☐
Accounts Dept.	☐	☐	☐	☐
Marketing Dept.	☐	☐	☐	☐
Sales & Distribution Dept.	☐	☐	☐	☐
Research & Development	☐	☐	☐	☐
Personnel Dept.	☐	☐	☐	☐
(Other? Please specify)	☐	☐	☐	☐

EXTERNAL/PUBLIC SOURCE

	D	C	B	A
General Press	☐	☐	☐	☐
Trade Press	☐	☐	☐	☐
Trade Association	☐	☐	☐	☐
Civil Service & Ministry	☐	☐	☐	☐
Commercial Database	☐	☐	☐	☐
Consultants	☐	☐	☐	☐
Banking & Financial Institutions	☐	☐	☐	☐

INPUT

6. What use do you make of computer based Decision Support Systems?

Frequent Use ☐   Planning To Use ☐

Occasional Use ☐   No Use of Decision
                                          Support Planned ☐

Use Rarely ☐

7. What Decision Support System products or services do you currently use or do you plan to use?

Product / Service: _____

Vendor: _____

8. Is this Decision Support System currently supplied to your company as:

a Software package for Mainframes? ☐

a Software package for Minicomputers? ☐

a Software package for Standalone Personal Computers? ☐

a Software package for Networked Personal Computers? ☐

a Processing/Bureau service? ☐

part of a Turnkey Solution? ☐

part of a Professional Services package (including for
example, Management or Marketing Consultancy)? ☐

9. Who is currently using the Decision Support System?

(Please indicate the Department and tick the appropriate staff)

Department	Professional Staff	Middle Managers	Senior Managers	Directors

- 120 -

INPUT

10. Please tick (✓) the statements which you consider to be true of your company:

True

- DSS is only used in Financial Planning & Analysis. ☐

- DSS is being extended beyond Financial Planning & Analysis. ☐

- DSS Tools are widely used throughout the organisation for many different applications. ☐

- Data is automatically transferred from the Data Processing System to the Decision Support System. ☐

- Data is entered into the Decision Support System manually. ☐

- A Data base of all company information has been established. ☐

- The company does not have an information centre. ☐

- The information centre in the company is used for the Decision Support System. ☐

- The information centre is well established and actively used. ☐

- There are very few personal computers in the company. ☐

- Personal computers are being linked to the mainframe facility. ☐

- Decision Support Systems are used on stand÷alone personal computers. ☐

- The use of computers by non-specialists is viewed with concern by the Data Processing Department. ☐

- The proto-typing of Applications is a common approach. ☐

- Expert systems, Productivity Tools and/or Applications are being reviewed. ☐

11. How many Decision Support Products or Services are currently in use in your company?

_____

INPUT

12. How much importance do you place on the following features of a Decision Support System?

	Essential	Important	Useful	Unnecessary
Data Management	☐	☐	☐	☐
Modelling Language	☐	☐	☐	☐
Forecasting Capability	☐	☐	☐	☐
Financial Functions	☐	☐	☐	☐
Statistical Functions	☐	☐	☐	☐
Word Processing	☐	☐	☐	☐
Report Generation	☐	☐	☐	☐
Graphics Capability	☐	☐	☐	☐
Financial Consolidation	☐	☐	☐	☐
Operations Research	☐	☐	☐	☐
System Operates within a Network	☐	☐	☐	☐
Access to External Databases	☐	☐	☐	☐
Micro to Mainframe Links	☐	☐	☐	☐
Open Architecture to other Software	☐	☐	☐	☐
Ease of Learning	☐	☐	☐	☐
Ease of Use	☐	☐	☐	☐
High Processing Speed	☐	☐	☐	☐
Economic Use of Resources	☐	☐	☐	☐
Vendor Support/Product Updates	☐	☐	☐	☐
Any Other Features? _____	☐	☐	☐	☐

INPUT

13. What effect has the use of Decision Support Systems had upon your organisation?

(eg., the Productivity of Professional Staff, the Quality of Managerial Decision Making)

_____

_____

_____

14. What importance would you place on the following criteria when selecting a Decision Support System?

Please rank in order of importance: 1 = most important, to 11 = least important.

Vendor Demonstration ☐

Price ☐

The Technical Consulting
Capability of the Vendor ☐

Use of System on Approval ☐

The Reputation of the Vendor ☐

References from Current Clients ☐

Training ☐

Documentation ☐

Hotline Support ☐

Comparative Benchtests ☐

Any Other Criteria or Comments?

_____ ☐

_____

_____

_____

INPUT

15. Have there been any problems with the use of Decision Support Systems?

(e.g., The level of Management awareness).

_____

_____

_____

16. What developments in Decision Support products or services would be most useful to your organisation?

(eg., the Development of Expert Systems which are easier for non-computer specialists to use.)

_____

_____

_____

THANK YOU FOR YOUR PARTICIPATION

Please return completed questionnaire to:-

Mr. P. Lines,
Prinicipal Consultant,
INPUT LTD.,
41 Dover Street.
London.
W1X 3RB
United Kingdom.

- 124 -

INPUT

APPENDIX D: VENDOR QUESTIONNAIRE

APPENDIX D

"Decision Support Systems in Europe"

Vendor Questionnaire

Respondent Name: _____

Title: _____

Department: _____

Company: _____
_____

Address: _____

: _____
: _____

Telephone: _____

Number of Employees: _____

Turnover 1984-1985: _____

Financial Year Ends: _____

Product Literature Available: _____

Copies received?: _____

Copies will be sent?: _____

- 125 -

INPUT

1.   What Decision Support System does your company currently offer?

What hardware and operating systems does it run on?

2.   Is your Decision Support System supplied as:

<div style="float:right">
<table>
<tr><td></td></tr>
<tr><td></td></tr>
<tr><td></td></tr>
<tr><td></td></tr>
<tr><td></td></tr>
<tr><td></td></tr>
<tr><td></td></tr>
</table>
</div>

i   A software package for Mainframes?

ii   A software package for minicomputers?

iii   A software package for standalone PCs?

vi   A software package for networked PCs?

v   A processing/bureau service?

vi   Part of a turnkey solution?

vii   Part of a professional services package
(including for example, marketing or
management consultancy)?

3.   How many installations are there:-

<div style="float:right">
<table>
<tr><td></td></tr>
<tr><td></td></tr>
<tr><td></td></tr>
<tr><td></td></tr>
<tr><td></td></tr>
</table>
</div>

i   In the United Kingdom?

ii   In France?

iii   In West Germany?

iv   In Italy?

(v   In the USA?)

- 126 -

INPUT

4. Is your Decision Support System specifically marketed to any particular industry sectors?

YES

    Banking & Finance   □   NO   General Marketing □

    Insurance & Reinsurance   □

    Manufacturing   □

    Public Utilities   □

    Wholesale Distribution   □

    Transportation   □

    Professional Business Services   □

    National Government   □

    Local Government   □

    Health Care   □

    Extractive Industries   □

    (Other?)

5. Is your Decision Support System specifically marketed to any particular cross-industry applications?

YES

    Planning or Analysis   □   NO   General Marketing □

    Operation Research   □

    Sales and Distribution   □

    Marketing   □

    Engineering   □

    Scientific   □

    Research and Development   □

    Finance & Accounting   □

    Legal   □
    Administrative   □

    Personnel   □

    (Other?)   □

- 127 -

INPUT

6. How important do you consider the following features of a Decision Support System?

	Vital	Important	Useful	Unnecessary
Data Management				
Modelling Language				
Forecasting Capability				
Financial Functions				
Statistical Functions				
Word Processing				
Report Generation				
Graphics Capability				
Financial Consolidation				
Operations Research				
System Operates within a Network				
Access to External Databases				
Micro to Mainframe Links				
Open Architecture to other Software				
Ease of Learning				
Ease of Use				
High Processing Speed				
Economic Use of Resources				
Vendor Support/Product Updates				
Any Other Features?				

- 128 -

INPUT

7. What do your see as the major marketing challenges for Decision Support Systems?

Product Positioning

Marketing Approach

Pricing Structures

Maturity of the Market

User Education

Technical Development

Technology Issues

INPUT

8.   What factors are, in your opinion, driving or inhibiting the market
     for Decision Support Systems?

     Drivers:

     Inhibitors:

9.   Who do you see as direct and partial competitors?

     Direct:

     Partial:

10. What do you believe is the life cycle for decision support software?

     Mainframe Software:

     Mini Software:

     PC Software:

- 130 -

INPUT